



FRIDAY, NOVEMBER 23.

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Contributions.

Line Signals at Night.

RAHWAY, N. J., Nov. 19, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I believe that most railroad men the world over have concluded that color is inferior as a signal to position, or form, by day; but I do not think they have the same conclusion as regards a night signal. It seems to me that the present practice is right, because the night forms a uniform sombre background for color signals, whereas, the background by day may be a blue and white sky, or the many bright colors, afforded by trees, houses and fields. Again, my experience with night position signals, leads me to maintain, that their form is not so pungent as their color, to say nothing of the extra gear in connection with such signals. Of course, it is possible to give a very inferior color signal if the lamp and lens, are both small and badly focussed; but I may say that I have never heard complaints of the inferiority of night signals where 8½ in. lenses and suitable lamps have been used.

As regards color blindness, it is my opinion that much fewer mistakes are occasioned thereby than would be the case with signals which are liable to be taken for partially open windows, or something else.

ARTHUR H. JOHNSON.

Short Smoke-boxes and Open Stacks.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I was looking over a back number of your paper yesterday, and I made out from two drawings of smoke-boxes that you are against the use of short smoke-boxes and open stacks. If your objection comes from the experience of a short smoke-box and straight short stack not working well together, a scheme of mine is likely to fall through. Most of our engines are still run with a diamond stack and short smoke box with the petticoat pipe for leading the steam into the stack. The thing is all right except that the cone inclines to scatter the sparks all over the first cars of the train, and it trails the smoke and gases so they fill the cars. It is well known that the open stack lets everything go straight up into the air. That, in my eyes, is the advantage of having an extended front.

It is not the 3 ft. of extra smoke-box that keeps an engine clean, it is the open stack that gives a long smoke-box its popularity. The putting on of the addition to a smoke-box is costly, and the extra weight makes the truck run hot. I am in favor of the open stack, but I favor democratic simplicity, and keeping to first principle, even in building locomotives. The ordinary smoke-box, with the nozzles level with the third row of flues from the bottom and a plain petticoat pipe has been found all right.

Nothing better has been tried since George Stephenson gave to posterity a perfect locomotive. I could write for an hour stating objections to the extended smoke-box. Then why not use the smoke-box as we find it with an open stack, and have all the good things working together. The right place for the nozzles is at the bottom of the smoke-box. That has been proved. Now here is my plan. Throw aside your stack with the cone and netting to suppress the draft, and put on an open stack as long as it could be set to clear, and prevent spark throwing by putting a netting across from the flue-sheet to the smoke-box casting. This would be the extreme of simplicity, and I would like any one to show what there is to prevent it working to perfection. The contrivance is cheap and simple; by its use no sparks would be pattering on the front cars all the time, ruining the paint. The passengers would not be suffocated with smoke and dust, and the front end of the train would have a modern appearance.

LOCOMOTIVE ENGINEER.

Examination of Trainmen.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Does it not strike you as being the least bit ludicrous that managers should consider an examination of their trainmen requisite when changing from their old formula to the uniform code, when they did not deem these examinations of sufficient

importance to conduct them under the old rules, either when employing men or advancing them in the service? Just why it should be of such vast importance to make these examinations when changing from rules, many of which were doubtful, conflicting, wordy, and in many cases obsolete, to rules that are, with possibly one or two exceptions, as plain and concise as it was possible for the gentlemen of the Time Convention to make them, and which men of even less than average intelligence can readily comprehend, I cannot conceive. It cannot be possible that they have just awakened to the importance of these examinations—to the fact that in presuming on the knowledge of their trainmen, they were trifling with a magazine that was momentarily liable to explode, with disastrous results to life and property.

In introducing the uniform code, the ground-work of railroading is not changed in the least, excepting perhaps in isolated cases; it is simply adding a new coat of paint to the structure, bringing the obscure and doubtful points out in bold relief; simplifying what was formerly liable to misconception. Take, for instance, the rules of the Central of New Jersey. * * * You might as well ask the average railroad man to solve a problem in trigonometry as to explain by example, or otherwise, rule 36 for instance. I struggled manfully with it for more than two years, and I have yet to learn why it should exist. Others are almost as antiquated in phraseology.

In your issue of Oct. 5 a general manager writes that the examiner on his road found it necessary when conducting examinations to "frame his questions in the simplest language possible." Why do not these gentlemen devote some of their time and talent to a system of instruction preliminary to these examinations? They certainly should not expect to hand a new employe a complicated set of rules and expect him to master them and pass an examination in transportation in a week or a month. But, in fact, they do much worse than that: they give him a copy of the rules and a time-table, turn him over to a brakeman to be "broken in" to the mysteries of railroading, permit him to interpret the rules to the best of his ability, and, after he has received such instruction as the brakeman has been disposed to give him in the course of a day or two, he is placed in charge of life and property, and may be advanced to positions of greater responsibility without any positive knowledge of his qualifications beyond the fact that he can sign the pay-roll. This is done with new men, while acknowledging that when examining their old employes—men who had years ago acquired the first principles of railroading—they found it expedient not only to examine by illustration, but also to simplify the language of the rules in order to get intelligent replies.

General managers, you have the animal by the tail, get him by the horns, and you can more readily make him understand what you require of him. The gentlemen of the Time Convention have assisted you very materially by so simplifying the rules that he who runs may read. The value of reading rooms and similar advantages to such employes as desire to improve themselves cannot be overestimated; but what you lack is a school of instruction in transportation in order that the men may thoroughly comprehend and have the same understanding of the rules. Many men prefer to remain in doubt as to the meaning of rules, fearing that by asking questions of their fellow employes they will disclose ignorance; it is this class of men which it is so necessary to reach and prepare for examination. Many of them having had but little experience are for that reason unable to comprehend the rules. Frequently when they have sought information they have been misinformed.

My idea would be to summon all employes for examination, at the same time informing those who feel in the least doubtful of their ability to pass a satisfactory examination, that they may attend this school of instruction to prepare themselves before being examined. Choose as teacher some conductor, or other employe specially qualified. It is a very essential consideration that he should be universally popular, because, having already the confidence of the men, he will accomplish much more in less time than one who is unknown or disliked; let him take as many men as present themselves—the duties of the men on the road will preclude the possibility of the of the classes being too large; furnish him with data showing the necessity for each rule; how some men have misconstrued them, and incidents of wrecks caused on that account, and in an easy, conversational manner entertain the class, while instructing and interrogating them. The class should be permitted to take notes and be requested to offer suggestions, and ask the instructor for information about the application of any rule or point that was not clear. Many good ideas would be advanced, and before replying to them the teacher should ask each one in the class to give his understanding of the query, or what he would do if placed in the situation imagined.

For instance, one might ask, "How am I to carry out that rule which says, 'when a train parts, the rear brakeman, after bringing the detached part to a standstill, must send forward the most reliable person he can command to make danger signals, etc.' when there is no one to command?" He would be told to place a red light in a conspicuous place on the forward car of the detached part, and then to get back as quickly as possible to protect the rear end of his train. Many such questions, which seem so trivial to the well informed, are riddles to the inexperienced. These queries and replies would be instructive to both teacher and pupil, and would give the former a better idea of the calibre of the men than could possibly be gained in any other way. The discussion in class would continue to occupy the attention of the men after leaving the room, arguments would follow, new ideas would be the result of these discussions, many of which

would have to be submitted for the instructor's decision. A few days' schooling would be all that would be required to prepare the men for examination.

A passenger train, for which we were side-tracked the other day, gave three blasts of the whistle; our fireman asked "what does he want to back up for?" He had been firing an engine more than two years and did not know that this was a signal to call our attention to the fact that the train was followed by another section. Some method of instruction is required to awaken the employes to the necessity of making themselves thoroughly familiar with the rules, to prepare them for examinations and to make them understand why they are required. A bureau of information for the patrons of the road is not of as much importance as a bureau of instruction for the men. It would certainly be a matter of economy—a sort of insurance against disasters caused by ignorance. There is certainly need enough of examining old men, but I consider it to be of even more importance that new men should receive instructions from some competent authority before being placed on trains—with a book of rules and a schedule in their pockets and nothing in their heads beyond knowing how to couple an engine and a bell cord. The admonition, "In all cases of doubt or uncertainty adopt the safe course and run no risk," is applicable alike to manager and trainman.

LANGDON.

A Standard Truck—New England Railroad Club.

At the meeting on Wednesday evening, Nov. 14. Vice-President Richards occupied the chair, and announced as the subject for discussion, "The Running Gear of Freight Cars and the Possibility of Adopting a Standard Truck for American Railroads." He stated that Mr. Bradley, who was to have opened the discussion, was unavoidably absent, and the matter would therefore be presented by Mr. Lauder, President of the club.

Mr. LAUDER: The older members of the club well remember the old wooden truck frames in use 30 or 40 years ago, a good many of which are still in existence, composed of two wheel bases with timbers framed across to hold them in shape, bolted on, with a short spiral spring over each jaw. The principles embodied in that truck have been perpetuated, in a somewhat improved form, and it is still the standard truck for several of our New England roads, and it may be argued that it is a good style of freight car truck. I do not think so.

The two chief objections to it are, first, the difficulty of getting in a spring that has sufficient action to compensate for the inequalities of the track over which we have to run; in fact, the springs ordinarily put over the journals are nothing but cushions, and in running over a rough road, especially in the winter, it is subjected to a twisting motion, because the springs have not movement enough to overcome the inequalities. The second and main objection, whether the truck be made of wood or iron, is the difficulty of keeping the jaws or pedestals in a vertical position. It is almost impossible to put any form of trussing that will not allow the jaws to become wider at the bottom than at the top, by springing out. This tends to wear the box very rapidly at that end, and forces the box against the lutton on the end of the journal. We are all familiar with the fact that in all that class of trucks, whether under passenger or freight cars, there is more wear to the outside end of the box than to the inside, because the weight of the car throws out the jaws, spreads them at the bottom; that wears the box laterally.

When the channel-bar truck, so-called, came into existence, 15 or 16 years ago, that was a decided step in advance. The cross bars of the truck were made of iron, riveted solid to hold the truck in place, a great improvement over the oak timbers formerly used, which would shrink and become loose and the truck would get out of shape, so that one wheel would be ahead of the other when in service, and the whole truck would get rickety and out of order, and the tendency would be to produce sharp flanges. Theisen took out a patent for the channel-bar truck; his truck was a good one for that time, but it is not strong enough for the heavier loads that our cars carry to-day. Modifications of that truck have been made by various roads, and its leading features are retained in the trucks in use at present.

I think the truck proposed by the committee of the Master Car-Builders' Association two years ago was of this style. My own opinion was that it would have been a good truck to adopt as a standard, but the Association did not so recommend it. I believe the time has come to select and adopt a standard truck, and that our knowledge is sufficient for this at the present time, on which point there is quite a difference of opinion. I believe in putting a swing-beam truck under the freight car as well as under the passenger car.

We are, perhaps, on the eve of a revolution in the matter of the speed of freight trains, and if the speed of freight trains is to be largely increased, we need a swing-beam truck more than we did before. We want to get our rolling stock in such shape that it will be ready to meet this increase of speed. For two or three years we have been running freight trains on our road entirely ordinary, with the exception that they are equipped with the automatic brake, with ordinary coupling, at 30, 35, and even 40 miles an hour, and I think these cars have done their duty without repairs very much better than they would if they had had a rigid truck instead of the swing-beam truck which they did have, and they are as safe and easy to manage as any of our passenger cars.

The question of the side bearings will bear a good deal of discussion. You may give a car a centre bearing, and however strong you truss up your bolsters the car will come down on the side bearings. The side bearing has two flat pieces of iron which slide very hard; in striking curves all there is to make these plates slide is the flange friction, making an immense strain on the flanges. When the flange friction is sufficient to force the truck round, it only carries it round far enough to allow it to run; there is nothing to make it go farther. The consequence is the flange on the front wheel grinds hard on the curve. When it goes off the curve there is nothing to draw it back except the flange friction, which throws it enough to allow it to run and it runs until it strikes a curve which turns it the other way; this produces sharp flanges on freight cars. Those roads that have the fewest curves are troubled the most with sharp flanges, with ordinary freight car construction; for the reason I have stated that a curve knocks the truck round under the car, and after it passes the curve the straight line knocks it back far enough to allow it to run, and it runs until it strikes a curve again and is knocked the other way. Under passenger cars we have a long wheel base, and the flange pressure will bring the truck about in line with the car, but with a short wheel base, as under freight cars, the case is different. This could be remedied by giving proper attention to the side bearings, of which many kinds have been tried and some abandoned. There will certainly be an advantage gained if the truck can be brought back straight

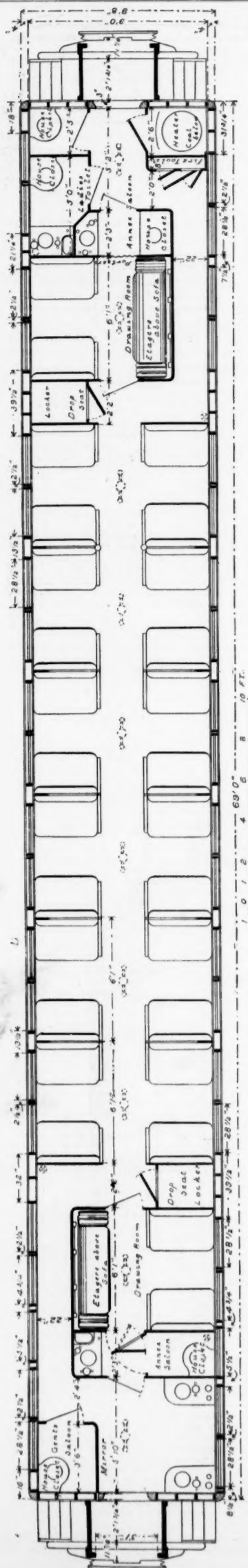


Fig. 2.
PULLMAN VESTIBULE SLEEPING CAR.

by some other means than the pressure of the flange on the rail. We have used several devices during the past few years, one in connection with a rocker, which brings the truck into a normal position when it goes from a curve on to a straight line, by the weight of the car; this does not act well on short curves. That difficulty was overcome by a design made by my draughtsman, which we have applied to our cars; the arrangement allows the truck to swivel easily and brings it back into the right position after leaving a curve.

With regard to the question of a standard truck for freight cars, I think the M. C. B. Association at its next meeting would do well to devote considerable time to this matter. It is a question of as much importance to the railroads of the country as any other, when we consider the annoyances we are subjected to from the great variety of trucks which prevail and the inevitable delays which often occur in getting foreign cars home. I think we could more readily adopt a standard truck than a standard draw-bar, because most of the draw-bars are patented, and that is a great obstacle to uniformity in their use. The M. C. B. Association have been working for some time to agree upon a standard axle for a 60,000-lb. freight car, and I hope at their next session they will not only give us that, but recommend a standard truck.

Later, in reply to a question by Mr. Marden, Mr. Lauder said that he did not think it possible to make a truck too rigid. He would have it absolutely rigid and get elasticity by the springs.

I am asked by a gentleman if I have ever seen a draw-bar that is worthy of adoption. I answer that I have, and I think the majority of the railroad men of the country today will join with me in saying that the Safford draw-bar is the best draw-bar that has ever been put into a car. We have bought the right to use it in our cars, not paying much, because the patent is about out.

Mr. MARDEN: There is no question that the subject of a standard truck for freight cars is of vital importance, not only to us who have charge of the rolling stock, and not only to the managers of the roads, but to the stockholders themselves. My experience has been that the variety of trucks is a source of continual expense, and I have no doubt if we could have a uniform truck, perhaps not a uniform frame for the body, uniform interchangeable parts, a road that now pays a dividend of 6 per cent. could afford to pay eight. If a truck could be devised to permit the brake to be hung outside the wheels I should prefer it for a freight truck, from the fact that it is so much easier to get at it to repair it and for an inspector in looking over the train. I don't think a truck hung from the body of the car is at all desirable for the application for the Westinghouse air-brake.

Trucks have been designed of the diamond form to carry a 60,000-lb. load, and they have broken down on our road under less weight than that, on account of the loosening and working off of the nuts, not because the arch-bars were not strong enough; if the load were supported directly from the upper arch-bar this difficulty would be avoided. The New York Central road designed a truck some years ago in which the upper and lower arch-bars were connected by a solid strap, welded on, making a very substantial truck. We have now running about 1,200 of the Jewett truck. This I consider one of the best of the diamond pattern. This carries the load on the upper arch-bar. Another factor which should enter into the car truck is something to keep it square. The Lehigh Valley has tried to accomplish this by diagonal rods running from forward to other parts of the truck, crossing them at the centre. The New York Central truck has a wide channel lug running from one side of the truck to the other and bolted to the pillar castings, and that has a tendency to keep the truck square. As far as side bearings are concerned, I believe in a centre-bearing truck, but I agree with Mr. Lauder that unless the cars are taken care of it becomes a side-bearing truck in a short time, especially if green timber is used. I believe that a car should have a pretty large centre-plate, and that the side bearings should be as far out as possible on the car body, and if iron bolsters are used, it seems that that difficulty of springing down on the side bearing will be overcome to a great extent.

As to the adoption of a standard truck, perhaps we are as far from it to-day as we were five years ago. We have adopted a standard pedestal and standard oil-box, but we are as badly off to-day with that box as before, from the fact that we did not adopt a standard cover. If a standard axle for a 60,000-lb. car is adopted it should be an axle that will go into a truck that has now the regular standard axle of the M. C. B. Association.

I thoroughly believe in swing movement trucks for freight as well as passenger cars, and 500 cars that we have built during the past season have the swing motion, and they have springs under them that will carry the cars easy when they are light and hold the load up when they are loaded. The trucks cost about \$50 more each than they would ordinarily, for being made in this way.

Mr. ADAMS: Among the early trucks was one not mentioned by Mr. Lauder, the simplest I ever saw, used on the Baltimore & Ohio road. It was simply two sticks of timber, running from one box to the other, with a band round the axle box extending up through the stick of timber. That truck was run for many years, and may be still in use. Out of that, I presume, grew the diamond truck, which we used to know as the Ohio truck, a truck which has had perhaps the most extensive circulation of any, but is, nevertheless, open to objections, one of the chief of which is that it easily gets out of square, and though it has been largely improved its formation is such that it will not hold up in position as a truck would with a rigid frame. A bearing of 12 or 15 in. in an extension of 6 ft. will not keep it square, and a slight obstacle to one of the wheels will displace it. Other objections are that the truck is hung from the body, and the brakes are between the wheels; the Westinghouse brake is much more easily applied outside the wheels than inside.

When I came on to the Boston & Albany road I was strongly prejudiced in favor of the diamond truck, and against the one in use by that road; but my familiarity with the latter and the improvements made upon it has led me to believe that it is now a pretty good truck, and will bear a careful scrutiny as we construct it at the present time. Nineteen-twentieths of the springs in the diamond truck are not over seven inches high, and probably many are less, and there are not more than eight or ten of them in a car. We use eight springs 7-in. in diam., 7-in. high, and I think we put as much spring in our truck as the diamond has. A truck to keep its place must have some stability of frame. We make a forged iron frame and put it clear round the truck; it takes a tremendous blow to knock it out of position.

With regard to centre bearings, the tendency of the car to come down on the side bearings can be overcome by putting something under strong enough to hold it up; we are using now two I beams for that purpose; our trucks have carried for the last six months an average of 68,000 lbs., and have stood it well, and we have never had a hot box to my knowledge. If I were building a new lot of cars I should make the truck stronger yet; we have designed a truck that we think will carry 100,000 lbs. without difficulty. The larger loads that are now carried require larger axles. In regard to riveted work, I am of the opinion that it should be avoided in truck building; the constant vibration will loosen the rivets; I should use bolts, and if the nuts are properly put on they will stay. Rubber packing between the different

layers of iron will give elasticity, and prevent the nuts loosening.

I do not think that speed enters so much into the question of damage as is generally believed; a train run at 40 miles an hour steadily will not be hurt so much as a train run at 15 miles an hour, frequently stopped, backed into a yard, and moved round little distances here and there, and yanked about on sidings.

I do not believe that we are going to get a uniform truck at present; I do not think we are prepared for it yet. We have not sufficient knowledge of the demand for heavy loads, or slow or fast running. I believe we are coming to a truck for freight more like our passenger truck, but the roads must be willing to pay for it.

Mr. WAITT: I think one feature to be considered in a standard truck is the amount of repairs it would require to keep the cars in service. Concerning repairs, several things are to be looked at: First, the style of the truck, whether rigid or swing motion. The question of speed comes in here. If you run a freight train 20 miles an hour or less, I think the extra expense of putting in the swing motion is perhaps lost; but as the tendency is now to high speeds, it seems to me that the swing motion is necessary to avoid as much of the jar as possible to the cars and trucks. I have not yet seen any truck that I think should be a standard. The Theilsson truck has advantages, but is liable to get out of true, and it is quite difficult to get it back. It is not so good, I think, as the rigid frame truck, such as that used on the Boston & Albany and Boston & Maine roads. The tendency of the jaws to get out of square, I think, might be obviated in the same way that it is in many passenger trucks, by tying them by connecting rods, which would hold them in place, the tendency of one to spring out being overcome by the tendency of the other.

I know of no truck that requires so little repair as the Boston & Albany style of freight truck. When it is repaired, however, it has to be taken all to pieces. This could be overcome, if instead of being made with a rigid frame it were made in four pieces, two of a kind, bolted together, with rubber between them.

I think a graduated spring should be used, adapted to the weight of the car and the load. Another thing in connection with repairs is the size of the axle in the centre, many being too small for the loads they carry, and to some extent unsafe on this account. On our road we make them four and a half inches in the middle, and they will stand an immense pounding before they will be sprung. I have always thought that the proper way to build a car was with a centre bearing.

I believe in standards, and also in sticking to them, and when standards are adopted some method should be found to secure uniformity in the patterns. Now, the M. C. B. Association have adopted several different standard castings, but they vary on different roads, and cannot be interchanged. Another difficulty in the way of having standard trucks or anything else is the personal desire to alter them after they are once adopted, on the part of the M. C. B. Association. Such changes create distrust, and more thought and care should be given to the matter before the standards are fixed upon.

Mr. SHINN: It is undoubtedly true that freight car damage principally occurs on switches and in yards, but that damage is more largely to the body of the car than to the draw rigging. I think the extra wear and tear due to high speed is mainly on the truck; in other words, cars run as they are on the Old Colony road between here and Fall River, not subject to much switching, but run at high speed, would require the larger percentage of repairs on the truck, while with cars in local service, subject to much switching, the greater proportion would be on the body of the cars. That seems to demonstrate that for high speed an improved truck is necessary. If different roads which use the same style of truck could agree upon the use of the same patterns for the interchangeable parts, that would be a step in the right direction, even if no absolute standard were established. If the members of this club would decide upon some standard to be used in New England, it might go a good way towards deciding the problem with the M. C. B. Association.

The Pullman Vestibule Sleeping-Car.

The accompanying engravings represent the latest form of Pullman vestibule car. Fig. 1 is an exterior elevation and fig. 2 is a plan of the car showing the interior arrangement. Fig. 3 is a cross section of the standard car, giving the dimensions, and fig. 4 shows the appearance of the vestibules on two cars coupled together.

The peculiar construction of the vestibule is shown in fig. 5. It will be seen that a continuous covered passage is formed

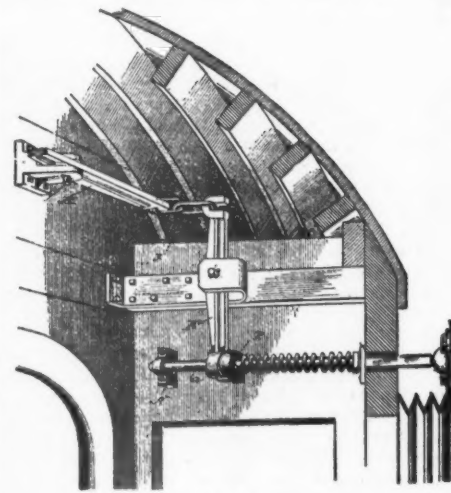


Fig. 5.

between the cars, and that passengers can freely pass from one end of the train to the other without being exposed to the external atmosphere. At present the operation of passing from car to car is decidedly uncomfortable under many conditions, especially when the thermometer is below zero, the train running at high speed over curves and the platform and handrails covered with a mixture of ice and cinders.

The vestibule connection as far as the passenger is concerned really renders a train of cars one continuous car. The connection is made with folded rubber diaphragms

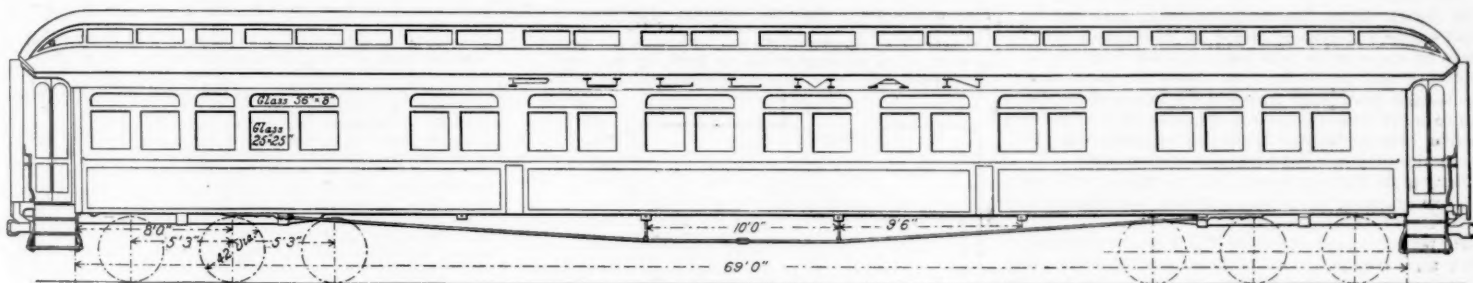


Fig. 1.



Fig. 4.

PULLMAN VESTIBULE SLEEPING CAR.

which enclose the platform, doors being provided as shown. The vestibules are as elegantly finished as any part of the car, carpeted so as entirely to conceal the points of connection between the joined cars, and illuminated by means of lights depending from the ceiling, whose rays fall through cut glass paneled doors full upon the steps. A night view of the train at a station presents the appearance of a series of connected residences, with brilliantly illuminated entrances.

The buffers are shown in fig. 5 and are designed to lessen oscillation, the friction of the buffer faces acting at a considerable leverage doubtless tending to lessen any independent motion of each car and check oscillation and swaying. This movement is especially felt by the occupants of the upper berths, and the diminished amount of oscillation is especially designed to add to their comfort. The end of the vestibule consists of a steel frame pressed against the corresponding vestibule frame of the next car by springs.

One method of arranging these springs, as patented by Mr. H. H. Sessions, is shown in fig. 5. The springs being equalized and applied near the roof, tend to keep the cars in line in a vertical plane and lessen the tendency to telescope, while the facility with which the cars round a curve is not impaired.

The vestibule cars are finished in different styles. The cars "America," "England" and "France," for example, are finished in a rare kind of mahogany, a very beautiful wood. The upholstery of the body of the cars is pale blue *glacé* plush, while the drawing-rooms are finished in satin-wood, and the upholstery done in terra-cotta red plush. The dining-room in the car "Ponce de Leon" is finished in French oak and upholstered in myrtle green plush. A novel feature of the dining-room is the enclosure of two seats (a section) by portieres, thus securing privacy when desired by a small party of travelers. The "Esperanza," a composite car, is finished in English oak. It contains a drawing-room, bath, buffet, writing desks, library and cabinets. The carpets throughout these cars are of the richest Wilton make, wrought in attractive designs, and the general effect of the decorations and furniture is not only highly luxurious, but pleasing to the most refined and fastidious taste.

The wheels used under these cars are 42-inch paper wheels manufactured by the Allen Paper Car Wheel Co. The journals are collarless 4 in. \times 8 $\frac{1}{2}$ in. The sleeping cars of this class with vestibules weigh about 90,000 lbs. The new cars now building have an arrangement for forcing water for washing and drinking purposes into the car, by compressed air taken from the air brake train pipe. The water is contained in cylindrical tanks under the car, alongside of which is a cylindrical air reservoir of similar dimensions, containing the compressed air. The use of air from the train pipe does not in any way interfere with the use of the air-brake. An air pressure regulator and shut-off cock keeps the air from the water tanks after the air pressure for these tanks has been obtained.

The cars on the New York & Chicago Limited are lit

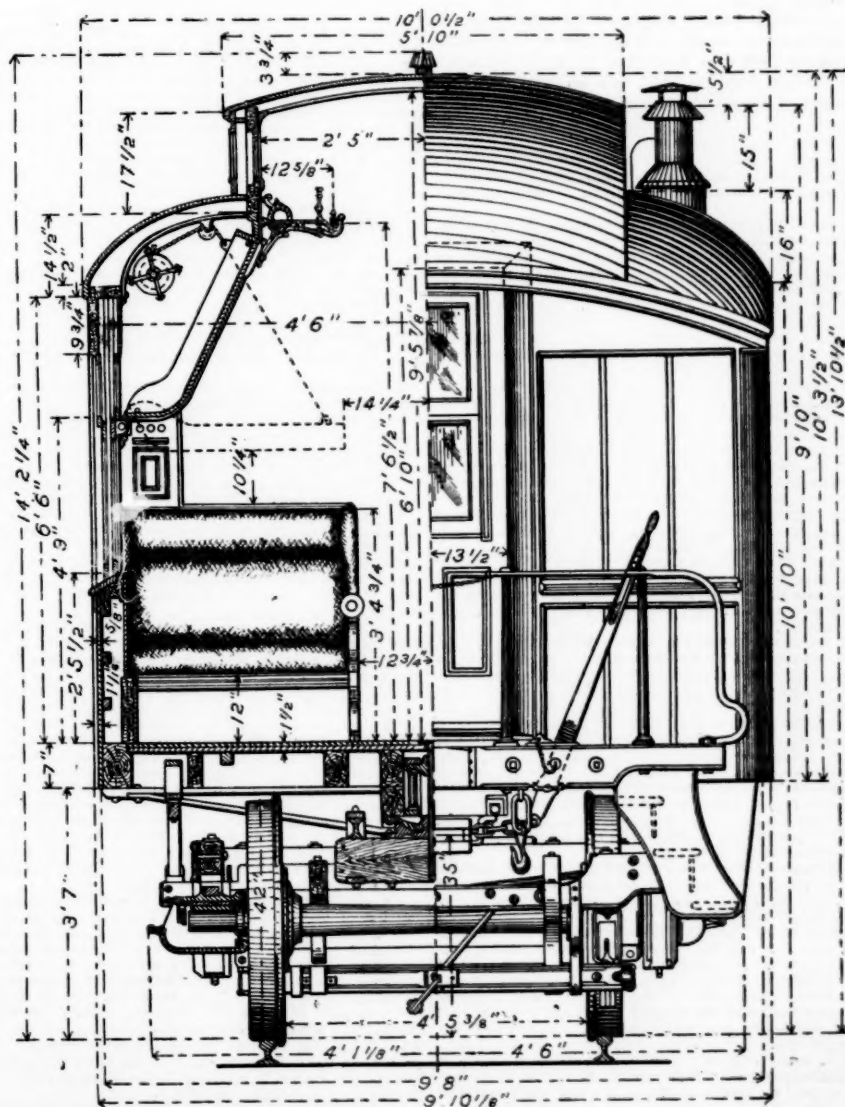


Fig. 3.

with electric lights, the electricity being generated by a small engine and dynamo placed in the baggage car, the steam for operating the same being obtained from the locomotive through connecting pipes. These cars also have storage batteries under each, from which a supply of electricity can be drawn when the cars are disconnected from the locomotive. The electric light is also used on several other Pullman trains running in different parts of the country.

Many of the Pullman sleepers will be heated with steam this coming season, this method of heating having given very satisfactory results last winter.

The plan of the car shown in Fig. 2 gives a clear idea of the general arrangement and of the accommodation afforded. There are two drawing rooms each, with special lavatory and water-closet. The car has, in addition, 12 sections, a ladies' saloon, a gentleman's saloon and another water-closet. Reckoning one passenger to each berth the car can accommodate 30 passengers. The lavatory and water-closet accommodation appears ample, there being five of each, or at the rate of one lavatory and one water-closet for every six passengers. Two drop seat lockers are also provided for bed linen, etc.

Vestibule cars seem increasing in favor, and are now being used on most of the more important routes. The advantages gained are not only in the greater freedom of locomotion from one car to another, but in the lessened amount of dust, noise, vibration and oscillation. While the principle of a vestibule or elastic-covered passage between cars is not novel, it has not been hitherto largely used on passenger cars. Though used at various times on the Housatonic; Chicago, Burlington & Quincy; Lake Shore and other roads, the construction of these vestibules does not appear to have given perfect satisfaction, for their use was not continued or extended. It has, however, been largely used between postal cars both here and in Great Britain. At the time, however when the Pullman vestibule was introduced, it is believed that the use of a vestibule on passenger cars had been abandoned everywhere except on the London & Northwestern (England), where a vestibule has for the last few years been used between some of the cars on certain express trains. The Pullman vestibule has been the subject of many patents and of some litigation. It is claimed that the form of vestibule as used by the Pullman Palace Car Co., and patented by Mr. H. H. Sessions, contains many important improvements on any vestibules hitherto constructed, and that the arrangement of springs forms an effective means of preventing undue oscillation when running, and is also a safeguard against telescoping.

Coal Burning—Western Railway Club.

At the regular meeting of this club held, Nov. 20, Mr. C. M. Higginson, Assistant Auditor Chicago, Burlington & Quincy, read a paper entitled "Western Coal Burning," of which an abstract follows. Much of the argument appeared in the *Railroad Gazette* July 20, 1888, and for that reason we reproduce less of the paper than we otherwise should have done:

Though I understand that the regular topic assigned for today is "Combustion," I will not use any time in treating of the chemical questions involved, but will proceed at once to that particular form of combustion upon which my notes touch.

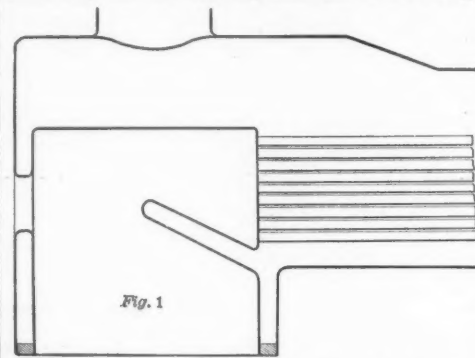
The importance of economy in coal burning is emphasized by the fact that on the first-class roads of the country the chance for large savings in operating the various departments by improvements in the general methods used do not promise any reduction which would amount to any appreciable percentage of the whole expense. An examination in turn of all the principal items of expenditure will show, we think, that while there is always saving to be effected by a close watch of and economy in details, the total amount involved will not reach any material percentage of the total operating expenses on any well-managed road. Neither is there much to look for from any future decline in labor or materials, as in labor matters especially the tendency seems to be upward rather than downward.

Mr. Higginson mentioned the apparent indifference of master mechanics on the subject of fuel economy, as shown for instance by the fact that the committee upon topics connected with combustion at the last Master Mechanics Convention reported that they had received but thirteen replies to the circulars of inquiry sent out, and of these replies, as published, a number did not present much that was valuable one way or the other. The only fact which seemed to be clearly shown by them was that there is almost an entire absence of reliable data or records upon which to base any conclusions as to progress in the direction of certain features involved in soft coal burning.

As railroad lines stretched out over the Western prairies, which were nearly devoid of timber, the cost of wood fuel increased, and attention was turned toward the use of coal, which had been used at a comparatively early date in the Eastern states. While no difficulty was apprehended in using the Pennsylvania bituminous coal, with its large proportion of fixed carbon and small percentage of impurities, it was not at first thought that successful use could be made of the long flaming, sulphurous and impure Illinois coals. The abundance of the Western coal supply, together with the ease with which it could be procured in many localities, and its cheap cost as compared with Eastern coals, which had to be transported long distances, kept the problem of its use constantly before railroad managers and mechanics.

One of the earliest experimenters in this direction, and one to whom in my opinion the railroad world owes a debt of gratitude, was the late C. F. Jauriet. Influenced by the report of the Messrs. Colburn and Holley upon the practice on foreign roads, he was the first to apply the theoretical conditions of soft coal burning to western engines, and the result of his experience still leaves western practice to a great extent. The Jauriet fire-box, as it was called, though it was in reality a combination of devices that had been designed by others, consisted of a water-table extending from the bottom line of the tubes diagonally upward and towards the door, occupying about the same position that the brick arch does now in many engines. (An outline sketch is shown in fig. 1.) Three rows of hollow stays, $\frac{3}{4}$ in. in diameter, extended around all four sides of the fire-box, the total area of the apertures in these stays being about one-fiftieth of that of the grate surface. Those engines when fired with a fair amount of care, made absolutely no smoke and developed a

high evaporation, while the adoption of the finger rocking grate did away with the trouble from the formation of clinkers which clogged up the fire. I have in my possession a copy of a circular issued in 1865, by the late C. G. Hammond, who was then superintendent of the Chicago,



Burlington & Quincy, calling the attention of employees to the fact that the efficient and smokeless combustion of Illinois coal in locomotives had been successfully solved, and stating that in the future passengers and officers by watching the engines could tell whether the engineers were doing their duty as far as coal burning was concerned.

When coal burning was first attempted in western locomotives the tendency was to use the same contracted fire-box, with a deep fire, that had been successful with wood burners. This necessitated a sharp blast so as to draw sufficient air through the thick body of coal to enable the fire to burn well. This involved throwing sparks and burning cinders whenever the blast was able to obtain a free passage through the coals at all. To obviate this difficulty various arrangements of cones and nettings were placed in the stack, which, by offering a certain amount of resistance to the draft, necessitated still further reduction in the diameter of the exhaust nozzles in order to sharpen the blast. Whenever a hole was made in the netting the surrounding country was deluged with sparks, setting fires in every direction, while the small exhaust nozzles used caused in many cases a material amount of back pressure in the cylinders with a corresponding loss in effective power of the engines. Indicator diagrams, if such could have been taken, would have shown results which would have greatly surprised the master mechanics on certain roads.

As time went on it began to be appreciated that larger grate surfaces with thinner fires were advisable, and this idea has steadily gained ground until it seems as if there was a possibility of running too far in the other direction. It also began to be appreciated that it was advisable to hinder the passage of the gases to the tubes by increasing the flame-way, and a water leg or brick arch began to be used. This had the additional advantage of promoting the admixture of the gases evolved from the coal with the air necessary for their combustion, and also prevented to some extent the throwing of fire. In consequence, after many ups and downs, we see a deflector, generally in the shape of a brick arch, widely used upon Western roads.

Then came up the question of air admission over the fire. The means advocated for doing this varied. Some contended that with proper firing the fires could be carried so thinly upon the grate that air enough would pass between the coals to burn the gases as they were being driven off from above. Others were in favor of admitting the air at the fire door and using a door deflector, as is done extensively upon the English engines, while still others were for admitting the air through openings in the sides of the fire box above the line of fire. A large number of mechanics, however, do not seem until lately to have given the matter much attention, so that we find great diversity both in opinion and practice.

From the results of practice both here and abroad, and from the nature of the chemical questions concerned, the following in my opinion seem the requisite conditions for the efficient combustion of western soft coals:

1. Ample grate surface. This allows a comparatively thin fire to be used.
2. Moderate draft so that the fire shall not be torn up, allowing large bodies of air to pass through the grate.
3. Ample supply of air over the fire.
4. Perfect admixture of this air with the gases evolved from the coal.
5. The requisite degree of heat to be provided for promoting the combustion of such mixture.
6. Ample flame-way so that the combustion can be perfected, and the greatest amount of heat developed before the burning gases enter the small tubes and are extinguished.

The advantage of ample grate area seems to be generally conceded, and builders, as a rule, are lengthening their fire-boxes. There is undoubtedly a limit to this class of extension, the largest available grate surface probably being that which a man can fire evenly and keep free from openings. The principle of moderate draft may be said to be firmly established by the introduction of the extended front end and the open stack. There is the additional gain found in the reduction of back pressure following the now common use of larger exhaust nozzles.

The use of a deflector for promoting the admixture of the air and gases is coming into quite general use. The brick arch furnishes the necessary igniting temperature to promote the combustion of the mixture of gases and air, even though the air may have entered the box at a low temperature.

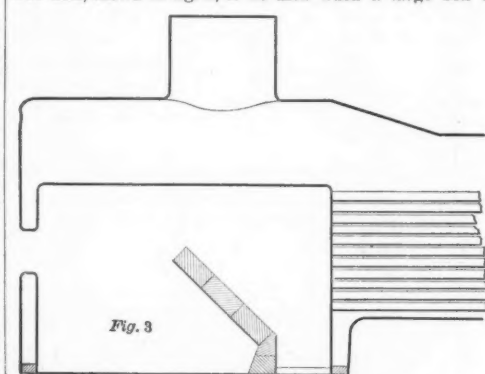
The question of air admission is a vexed one, being in somewhat the same stage as the use of a brick deflector was a few years ago. As we have said, certain mechanics favor the handling of the fire so that the necessary amount of air will pass between the coals. In some cases, with very careful firing, this can undoubtedly be done, with good results both as to evaporation and freedom from smoke, but there is the danger of having too thin a fire in spots, so that too large amounts of air will be allowed to pass through the grates. In ordinary practice up to the present time, devices for admitting air have to be such that they will give the best results with only average care in firing.

As regards the distance needed in which to effect the combustion of the ignited gases we find but little progress has been made. The introduction of the brick arch has increased efficiency to some extent, but a careful examination of the length of flame from ordinary soft coals will convince the observer that even with the forced draft of a locomotive the distance from the edge of the fire-brick arch to the tubes is not sufficient. While the Wootten and Strong fire-boxes are examples of attempts to avoid this difficulty, but little effort is being made as regards the box for the ordinary 8-wheeled engine. In short, we find but few engine boilers which contain all the elements referred to as being requisite for approximately complete combustion.

We have quoted the Jauriet box as giving comparatively good results in its day, but there were several points in which it came short of the ideal performance. As a rule the

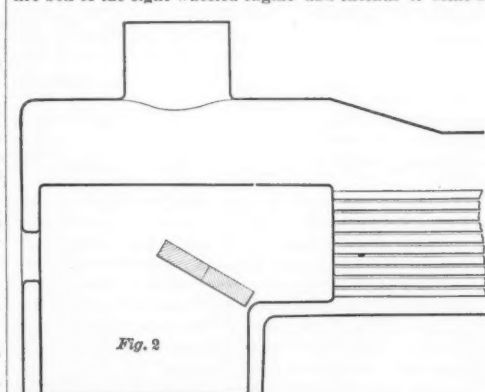
boxes were quite short, the travel was not long enough between the turn of the water leg and the tubes, and as a small barreled stack with cone and netting was used the blast had to be quite sharp. In many boxes where the brick arch is used, there is, besides the fault of short travel, an insufficient quantity of air supplied, often no means being used for the admission of any air above the line of fire. In some cases where the extended front end and straight stack have been used there has been no brick arch. In one case where the requisite flame-way was obtained by a separate combustion chamber connected with the fire-box by large tubes there was no provision for an air supply, nor was there any deflector used. In another case reported, where a combustion chamber was extended into the boiler shell and no arch or air supply was furnished, complaint was made that the sheets gave out at the turn from the fire-box, which it would be natural to expect. In the Wootten and Strong boxes, when sufficient travel is provided, we have a construction which is heavier than might seem necessary. In short it is doubtful whether there is an engine in existence for burning Western coals which presents a construction capable of fully meeting the various conditions which seem necessary to efficient performance; and yet such a device is reasonably simple in construction and cheap in first cost.

I would submit two designs for locomotive fire-boxes which seem to me to cover all the requirements of the case. The first, shown in fig. 3, to be used when a large box is



required for mogul or consolidation engines, is substantially that used in the Class H engines built by the Chicago, Burlington & Quincy Railroad and illustrated in *The Railway Review* of Oct. 20, 1888. Here we have the large grate surface and a brick arch. A combustion chamber has been formed by the space behind the brick arch, which space has been further lengthened by the width of the dead dumping plate. The air supply as originally arranged was not sufficient, there being no chance to put hollow stays on all four sides of the box owing to its shallowness. An adequate air supply, and perhaps a short extension, not to exceed 15 in., of the fire box into the boiler shell, would complete the device as far as combustion goes.

The other device, shown in fig. 2, takes the ordinary 6-ft. fire-box of the eight-wheeled engine and extends it some 30



in. into the boiler shell, forming a combustion chamber about 5 ft. in length from the end of the brick arch. The requisite air supply is furnished through hollow stays supplemented, if necessary, by larger holes at the back end, so that the full area of hollow stay apertures (one-fiftieth of the grate surface) can be reached.

With these two patterns of boxes we shall have engines which will show a most satisfactory performance. They will burn a clear fire with moderate draft, large nozzles and open stack. The front end need only be made large enough to equalize the draft through the tubes. There will be comparatively no smoke with fair firing, and no fire will be thrown, as but few sparks will leave the fire-box. The evaporation will also reach a high figure on account of the clear, hot fire in the box and combustion chamber, and, the combustion being nearly perfect, the gases will enter the tubes at the highest possible temperature. In these plans there are no especially new features, the arrangement being merely a grouping of devices already in existence in a disconnected form.

The objections raised against the combustion chamber by reason of the loss of tube surface I will not take time to discuss at present, believing that such loss is more than balanced by gains in other directions. Neither is it my aim to touch now upon better methods of utilizing the heat developed by the high perfection of combustion to which we hope to attain, but I have tried to keep close to my text, which was combustion as applied to Western soft coals, and in so doing I hope have not wearied you.

DISCUSSION.

President RHODES: I would like to ask you, Mr. Higginson, whether you have had any fire-boxes constructed after the method you advocate?

Mr. HIGGINSON: No. The nearest approach is the old style of C., B. & Q. boiler with brick arch and hollow stays. The fire-box with a separate combustion chamber is used on the Central Pacific Railroad, and I received a letter not long ago from Mr. Stevens about it in which he said it was giving very good results, but I do not think all of these features that I have mentioned have ever been grouped together.

Mr. GIBBS: In looking up this subject it is surprising to find how much more attention was given to the perfect utilization of coal, in the early days of locomotives than of late years. Many of the early works mentioned devices in the shape of water-legs, fire-brick arches, separate compart-

ments, etc., for the more economical burning of coal. After that we hear of them one by one being abandoned. It seems to me that the difficulties of keeping a complicated fire-box in order and the greater skill required in firing, and bad water, have led to the adoption of the simplest form of box, simply a square chamber surrounded on all sides by water. But now we are again giving attention to increasing the capacity of our locomotives by some means. The weight and speed of trains have increased out of all proportion to the increased strength of the permanent way, and that appears to me to be a strong reason for casting about for means to make a locomotive more efficient without adding to the weight. This leads us to a modification of the dimensions of the fire-box and a reversion to the old ideas of arches and combustion tubes. I think there is no doubt that we need air over the coal in the fire-box for complete combustion. This may not be necessary for the engine's work, but if we want to consume the smoke we must have some further device to get the air over the coals. It seems to me that some such device as was mentioned by Mr. Clark, that is to say, hollow combustion tubes with a steam forcing jet, would be desirable for getting the air in sufficient quantities.

The PRESIDENT: I call the attention of the Master Mechanics to the use of the brick arch. I see several gentlemen here who use the brick arch and some who do not, and I would like to provoke a discussion between them.

Mr. HACKNEY: We do not use the brick arch on the Santa Fe, the principal objection being bad water; in which case we find the brick arch very much in the way.

Mr. WILLIAM FORSYTH: The Master Mechanics at their last convention passed a resolution which recommended the brick arch as a desirable improvement in the locomotive fire-box, and it was passed by a large majority, showing that the great body of Master Mechanics of this country were favorably disposed to use the brick arch. The radical departure which Mr. Higginson makes, and the essential feature, is the substitution of a combustion chamber for so such tube area. As to whether that is an improvement or not is a question which I think has never been settled. I have suggested that it would be desirable to make some experiments to show the relative value of the tube heating surfaces and fire-box surfaces. Mr. Higginson reduced the tube heating surface, and he thinks the value of the space thus obtained in the fire-box for the more complete mixture of the gas is greater than the loss which he gets in heating surface off the tubes. None of our Master Mechanics have been bold enough to build a boiler such as Mr. Higginson has recommended, simply because they are afraid of not having enough tube surface. Nevertheless I believe the experiment is one well worth trying, and I intend to do what I can towards making it.

Mr. GIBBS: The Chicago, Burlington & Quincy will be doing the railroad world a service if they do equip some locomotives after this pattern. I believe you can get too large a grate surface for locomotives very easily. To burn a fire successfully you need to burn it at a white heat, and a grate surface that is too large will not burn the fire as successfully as a smaller one. Referring to Mr. Higginson's diagrams, I should prefer the second figure. That would give us all the area we need for combustion, and at the same time do away with the difficulties of the shallow fire-boxes.

Mr. HACKNEY: A gentleman from Detroit had an idea of building the arch like a gas retort, surrounding all three sides with fire-brick, running in about 3 feet. We tried it and found fairly good results. We carried that retort shaped receptacle farther into the fire-box, very similar to fig. 3, having a dead grate right underneath the sheet. Our trouble with that was that the air got hot and warped the plate, and we had to abandon that plan. Then we tried the receptacle hollowed clear in, and we got some good results. We were just carrying on the experiments when we had to use the engine, and we never had a chance to get an engine to experiment on since.

President RHODES: I should like to have some gentleman get up and say that Mr. Higginson's device cannot be used on account of the brick arch. I know that some of you think so. Personally I think you can use it.

Mr. SETCHEL: Although not a member of the Club I am very much interested in the working of locomotives, especially the burning of coal. As has been stated by the gentleman who read the paper, our first experience over most of the western roads was with the old wood-burning fire-boxes, and it was a question whether we could use them successfully to burn coal. I can remember very well that the general manager of one of our western roads said to me at the time the road with which I was then connected commenced burning coal, "you had better pay \$6 a cord for wood than to attempt to burn coal, but as you have chosen to burn coal I should like very much to see your sheets two years hence, when you will have to renew your fire-boxes." But the matter was taken hold of energetically, and it was determined to burn coal and burn it successfully.

A master mechanic of a Western road saw in the East some hard coal burners with short fire-boxes, and so he shortened his. He was burning bituminous coal and the experiment was a complete failure. He got the heat so near his flues that he couldn't keep his flues or his fire sheets tight, and all the engines he changed were disabled. The great secret of coal burning is that you must draw the air through the coal when your engine is working, in order to get steam. You cannot get it any other way. You can stall an engine with the fire-box full of coal just as quickly as by not putting in coal enough. At the last Master Mechanics' Convention, a resolution was passed by a large majority, that the brick arch was necessary to successfully burn bituminous coal, and I believe it. Success with the brick arch depends upon how it is placed in the fire-box. It must not be laid up against the sheets, because it will keep the sheets at that point hot, while other portions are cool, resulting in vibration of the metal until it is only a question of time when there is a crack at that point. The arch should be suspended on pipes, as on the Pennsylvania. That admits of the ready removal of the bricks. With hard coal, however, there is a scouring process going on under and over the arch, which will sometimes cut the pipes and engines become disabled on the road. The transportation department are loth to overlook this, and the master mechanic is at once told, "Don't put in any more brick arches if that is going to be the result." To avoid this, get good, sound tubes; be sure that they will stand a certain hydraulic pressure that shows there are no thin places in them. Then, see that they are kept clear, that the water circulates through them all the time, and by careful observation find out when the tubes get dangerously thin and remove them in season, just as we remove axles before they break. I at one time claimed that the tube would take the muddy water from the leg of the fire-box and deposit it on the crown sheet, but it has been demonstrated that the contrary is the result, that on crown sheets where those tubes are used the tendency is for the water to circulate over and clean the crown sheet completely. The brick arch properly used will do away almost entirely with the volume of black smoke seen on so many roads. It is a good deal more important to have a traveling fireman, a man thoroughly skilled, than it is to have a traveling engineer.

Mr. HICKEY: In the main I agree with the able paper read



THE RAILROADS OF CHILI.

NOTE.—The full lines represent completed railroads; the broken lines railroads projected or constructing; the dot and dash lines territorial boundaries.

by Mr. Higginson. I am certainly a warm advocate of the brick arch. I think it is an absolute necessity for the proper combustion of coal.

The PRESIDENT: Don't you find that your engines are considerably delayed in the shops, when you want to wash your boilers out, by having this red hot brick arch in the fire-box?

Mr. HICKEY: There is some delay, to be sure, but it more than pays for itself in the even temperature it creates in the fire-box and the aid to combustion.

Mr. JOHANN: I am decidedly in favor of brick arches, although I have not used them for some years. I used brick arches some years ago, and, as I thought then, quite successfully, although I did not make any regular practical test of the matter to see just what it would do. From what experience I had with them then I am satisfied that they are the proper thing to use, as an aid to the more perfect combustion of your fuel. They also prevent the excessive lifting of cinders from the stack, and certainly diminish the smoke. My reason for not using them of late years was simply that we were very busy and wanted all our engines all the time, and did not have time to stop and put on that addition. I can not say that I ever experienced any difficulty whatever in washing out, and never had any trouble with side sheets at all. As I used them they were simply a regular arch sustained on angle irons, not side sheets; consequently they were bearing against the side sheets continually, and we never had any difficulty from that source. Sometimes in the course of six months they would get so loose that they would fall down, but it never took more than 15 or 20 minutes to put them in place again. But the water tubes do give out, and the transportation department naturally objects, but, as Mr. Setchel says, if you observe that matter closely and see about how long your tubes will run, and renew them before they give out you will be all right.

Mr. A. FORSYTH: We use brick arches on the C., B. & Q., and do not find any delay in washing out.

Mr. GIBBS: About a year ago Mr. Barr proposed to put the brick arch in one of our passenger engines, and there was great opposition among the engineers. None of them wanted to be the one to run the engine. But after having them in use about a year we cannot obtain fire-brick fast enough to fix the engines. There is no question in our minds as to the economy and benefit to combustion.

Mr. COOPER: I may say that for my part I am not in favor of the brick arch. I used to run on the C., B. & Q., when they were using the Jauret fire-box, and have always been in favor of a water leg, although I have been in charge of engines where we did not use them. The combustion with a water leg was always very satisfactory, and they were always good steaming engines. As to the black smoke, that is caused more by firing than in any other way.

Mr. PRAYER: We have been using brick arch and tubes

about eighteen months, and we have not had any case of trouble. They are very good steaming engines, and comparatively light on the fuel. I believe something very like this fig. 3, shown by Mr. Higginson, has been tried on the Long Island road. I saw it down there in some of their hard coal engines, and the results obtained were very good. For burning bituminous coal I think the plan is all right.

Mr. G. W. Ettinger, late Master Mechanic of the Chesapeake & Ohio, then read a paper upon "The Use of Iron as a Material for Cars."

Railroad Development in Chili.

BY S. H. LOCKETT, C. E.

At last the spirit of the nineteenth century seems to have found a lodgment among our neighbors of the South American continent. In the Argentine Republic an activity exists, in internal improvements and material development, second only to that which has characterized the United States for the past quarter of a century. From the great commercial port of Buenos Ayres railroads are reaching out northward and westward, across the pampas of the east, up into the mountains of Bolivia, and to the feet of the Royal Cordilleras, which separate this growing republic of the Atlantic from Chili, its equally vigorous sister, whose two thousand miles of coast are bathed by the placid waters of the Pacific. Even now two private companies have concessions from both Chili and the Argentine Republic for lines of railroad which are to cross the barrier of the Andes, hitherto considered impassable. By climbing the slopes of this mighty range, by winding up its crooked and rocky gorges and finally by tunneling the snow covered summit, they will unite two peoples who have a common language, have had many things in common in their past history, and have now many common interests, though they look upon the waters of opposite oceans.

Similarly, though not to so great an extent, Brazil, Peru, Ecuador and Columbia are talking of new railroads, and in nearly all of them more or less actual work is going on. Men of more than middle age are living in Chili, who confidently talk of one day coming to New York in two weeks, by a railroad which, starting at Port Montt, near the island of Chiloe, will have its northern terminus at some point on the north coast of Columbia or Venezuela.

This may not be an idle dream, for even now the Chilean

government is under contract with an American construction company to build nearly 700 miles of railroad, much more than half of which runs in a north and south direction. And the same government has made proposals to the same company to undertake the survey of another north and south line of over 600 miles in length. Chili already has of lines running north and south about 430 miles, so that at the end of five years, when the American company's contract is fulfilled, she will have over 800 miles of such lines. A glance at the accompanying map will show these various lines constructed, constructing and proposed, which, all together, sum up nearly 1,500 miles in length.

The importance and significance of all this activity must be apparent. By the right of conquest in her recent war with Peru and Bolivia, Chili now has possession of provinces which once belonged to those countries. She has the right of occupancy of other provinces for ten years from the close of the war. At the end of that time those provinces are to decide by a plebiscite whether they will be permanently a part of Chili or return to their allegiance to Peru. Chili evidently believes in the binding power of steel rails, and it is into these doubtful provinces she is now figuring to extend her railroad system. Likewise into the one-time turbulent country of the indomitable Araucanian Indians in the south, she has already penetrated many miles, and is rapidly penetrating still further. All this is deliberately done as a civilizing, pacifying and unifying measure. Chili believes that the scream of the steam whistle is better to be heard in the land of her former foes than the blast of the war bugle. She is wise in taking this view of the matter. She is also energetic, intelligent, and possessed of ample financial resources to carry out her scheme. She has in her treasury to-day a surplus as large, proportionately to her population, as that of the United States. This surplus is steadily increasing from the proceeds of the guano deposits and nitre beds of her own territory and that once belonging to Peru and Bolivia which she now holds. All these facts, and many others too well known to the reading public to justify even a mention of them, indicate that Chili is to play an important part in the future destinies of the Spanish American republics. That she aspires to be a leader in the progressive movement now taking place there is no doubt. Likewise, there is no doubt that she has a live and wide awake rival in the Argentine Republic.

In many respects the latter state possesses marked advantages in the race. Her geographical position brings her into quicker, closer and cheaper contact with the United States and Europe. She possesses a much broader domain, and proportionately greater area of agricultural and habitable lands. She has an important start of Chili in one respect, namely, there is already a strong tide of immigration flowing from Europe into her pampas and llanas and mineral regions. The vital question to our Spanish speaking neighbors is, can these two competitors for pre-eminence in South American affairs be wise in their rivalry? Can they harmonize and not antagonize their interests? Let us hope that they can, and that their good example of energy, of enterprise, of stability of government will exercise a healthy influence upon their sister republics, and bring about an era of prosperity which the natural wealth and resources of those countries certainly entitles them to enjoy.

The following figures are taken from the official report of the Minister of Public Works to the Congress of Chili, which adjourned on the first of last September.

I. Lines of railroad owned by the state.

1. Road from Valparaiso to Santiago (begun in 1832, finished by Henry Meigs in 1863, length.....)	187 kilometres.
A branch of same from Las Vegas via San Felipe to Los Andes (to be extended across the Andes to Mendoza to meet the Argentine road).....	45 "
2. Road from Santiago south. 1st section to the River Maule.....	304 "
2d section from the Maule to Concepcion.....	413 "
3d branch from Angol to Traiguen.....	72 "
4th " " Renaico to Victoria.....	75 "
Total now in operation.....	1,096 "

II. Roads owned by companies, beginning at the north.

1. From Port of Arica to Tacna.....	63 kilometres.
2. " " Pisagua to Tres-Marias and branches to mines.....	106 "
3. From Iquique to Tres-Marias and branches to mines.....	194 "
4. From Patillos to Salitras del Sur.....	93 "
5. " " Mejillones to mine Cerro Gordo.....	29 "
6. " " Antofagasta to the rich silver mine of Huanchaca, Bolivia.....	297 "
7. From Taltal to Cachinal.....	82 "
8. " " Chañaral to mines of Salado.....	60 "
9. " " Caldera to Copiapo, with branches to mines.....	242 "
10. From Carrizal to mines of Cerro Blanco.....	81 "
11. " " Coquimbo to La Serena.....	15 "
12. " " Coquimbo to Ovalle.....	123 "
13. " " Serena to Elqui.....	78 "
14. " " Tongoy to mines of Tamaya.....	55 "
15. " " Linares to coal mines south.....	40 "
Total private roads in operation.....	1,538 "

III. Roads projected, surveyed and to be constructed by the state, and for which Congress made appropriations, amounting to \$3,542,000 sterling. These roads are comprehended in the contract made with the Chilean government by the "North and South American Construction Company, of New York."

1. From Victoria to Valdivia and Osorno (ultimately to be prolonged to Port Montt)..... 408 kilometres.

2. Branch from Colhue to Mulchen.....	43 kilometres.
3. From Concepcion to Cafete.....	160 "
4. " " Tomé to Cauquenes and Parral.....	200 "
5. " " Talca to Constitucion.....	85 "
6. " " Palmilla to Alcones and Pichilemu.....	45 "
7. " " Palequén to Peremo.....	35 "
8. " " Santiago to Melipilla.....	50 "
9. " " Santiago to Peñon.....	27 "
10. " " Calera to Cabillo.....	76 "
11. " " From Los Vilas to Illapel and Salamanca.....	128 "
12. " " From Ovalle to San Marcos.....	60 "
13. " " Huasco to Vallenar.....	48 "
Total projected.....	968 "

During the Congressional discussion some of these roads were modified, others left off the list and others extended, so that the final action was taken on about 1,000 kilometres of roads, making a grand total of 2,654 kilometres, or 1,659 miles of road in operation, and about 600 miles to be built in the next five years.

Congress, as already stated, granted concessions to two private companies to construct trans-Andean roads, one starting from San Felipe to cross by the pass of Uspallata near the highest mountain in the Western hemisphere, Mount Aconcagua, and to unite with the Argentine system at Mendoza. The other starting from Yumbel crosses at the pass of Antuco, near another magnificent cone-shaped, snow-capped, volcanic peak of the same name. On these two roads the Chilean government has guaranteed the respective companies an interest of 5 per cent. on cost for twenty years.

The general scheme of the Chilean government is to build a great trunk line as nearly as possible midway between the Andes and the coast. This will be the main longitudinal tie rod, holding together the widely separated extremities of the long, narrow country. From the central line lateral branches are sent out to the coast and up into the mountain valleys, as facilities are offered on the one side by breaks in the coast range, and on the other side as inducements are offered by fertile agricultural or rich mineral regions.

The Chilean government does not expect that all of her new railroads will immediately pay as a financial investment but as a means of developing her resources and as measures of political stability she has no doubt of their wisdom. Profiting by the example of the United States in driving the great transcontinental lines across the uninhabited plains of the West in advance of population, a feat to which Chilean statesmen constantly refer, they propose by similar means to bring their country up to her proper place in the scale of nations. They are a proud, patriotic, enterprising people. We of the great republic of North America can but wish them God-speed in their efforts at self development.

Train and Engine Brakes.—New York Railroad Club.

At the meeting of the New York Railroad Club, Thursday evening, Nov. 15, the first paper read was by Mr. James Howard, Manager of the Beals Brake Co.

TRAIN BRAKES WITH SPECIAL REFERENCE TO LOCOMOTIVE BRAKES.

The paper was admirably prepared and presented, but very long, and we shall attempt to give only an abstract. The writer defined "brakes" to mean "a device for absorbing and neutralizing the momentum of moving railway vehicles by friction between brake blocks and wheel tires," and proceeded to formulate the mechanical axioms which should control the construction of all locomotive and train brake devices.

The first axiom laid down was: All railway vehicles should be equipped with brakes. To stop and to stop quickly is as essential in railroading as it is to start and to move rapidly. It is indeed far more essential to the safety of life and property.

The next axiom is: All train vehicles should be equipped with power brakes.

The third axiom is: Every wheel of the engine, tender and train should be covered by a brake. This is essential to good brake work and it is impossible to attain the highest efficiency without it.

The fourth axiom is: All brakes should be squeeze brakes, i. e., each wheel should have a brake block on each side of it. Effectiveness is the measure of a brake's value. A brake that falls below the highest attainable effectiveness has no value, and no brake device can reach the highest standard that uses a brake block on one side of a wheel only.

The fifth axiom is: A perfect brake device must be independent of the vehicle and automatically adjustable, i. e., it must put all the stress of its pressures upon itself, fulcruming one stress against the other in such a manner that the framing, axles, axle-boxes, pedestals and springs are perfectly free from all brake strain, so that every shoe in the series must get automatically its proportionate pressure, no more, no less.

A sixth axiom is: Simplicity and certainty are the two indispensable essentials in all practical railway work, and especially so of safety appliances. Therefore, if any brake does not possess these two essentials, be it locomotive or train brake, we may safely conclude that it should be improved or discarded.

Mr. Howard next considered briefly the motive powers applicable to brakes. Considering hydraulic power and electricity as for the present abandoned, there remain to consider air, vacuum, steam and momentum. Of these four the choice up to the present time for train brakes has fallen upon the two first, but steam is the prime motor in both cases. The conversion of steam pressure into vacuum and air pressure requires the introduction of intermediate devices between the prime source of power and the brake. This violates the principle of simplicity and certainty, mentioned in the sixth axiom, and the effect in practice is to cut down the initial pressure, say 50 per cent. in the case of air, 90 per cent. in the case of vacuum, necessitating larger motors and increased leverages to obtain like results. But this must be endured until some one has discovered a practical method of carrying the steam pressure direct to the wheels of a train, or made it possible to eliminate all intermediate machinery, by the practical development of the momentum principle. Until that time arrives air will undoubtedly maintain its ascendancy as a motor power for train brakes.

The objection to using steam as a motive power for a train brake does not apply to its use for a locomotive brake. How-

ever good may be the reasons for operating train brakes by air or vacuum, none of them apply to locomotive brakes, that is to brakes that can be operated by a motor placed upon the locomotive itself. In all such cases steam is more simple, more economical, more direct, and, above all, more sure. Some think that because they have air already upon the engine, it is better and cheaper to use it for the engine brake than it is to make an entirely independent use of steam; but the use of direct steam in reality lessens the complication of valves and the demand upon the air pumps and reservoirs, while the certainty of action is enhanced and there is an additional guarantee of safety.

Thus a seventh axiom is arrived at, viz.: All locomotive brakes should be steam brakes, and this brings us to the inquiry, what are we to regard as the standard of effectiveness in the operation of a brake? The effectiveness of a brake is measured by the friction it creates, limited by the wheel adhesions. The utmost limit of friction, short of skidding the wheels, is the duty of all power brakes. Capt. Galt evolved from the series of Westinghouse-Galt experiments, that 80 per cent. of the wheel weight was, under conditions noted by him, a fair average estimate of the endurable brake pressure. The Beals Brake Company have adopted this as their standard pressure, using a small cast-iron shoe against a steel tire, and their experience is, that it cannot be safely exceeded; so that we may assume that an effective brake will exert a pressure equal to 80 per cent. of the wheel weight, and that no brake that falls much below this, or goes much above it, can be up to the true standard of effectiveness.

The author spoke next of locomotive brakes, using the term to indicate a brake applied to the engine truck and to the tender wheels as well as to the drivers. It is a broader term than driver brake. The driver brakes in use in the United States are of three classes. The wedge or crowd brake, the pull brake and the squeeze brake. The wedge or crowd brake is so called because it crowds or forces the wheels apart after the manner of a wedge. The pull brake has one shoe to a wheel, and pulls them all in one direction. The squeeze brake has a shoe upon each side of each wheel and squeezes the wheel between them. I shall now ask you to refer to the diagrams which illustrate these three classes of brakes.

The earliest example of the locomotive wedge or crowd brake is that of which fig. 1 is a diagram. This was patented by Robert Stevenson in 1833. It is a steam crowd brake,

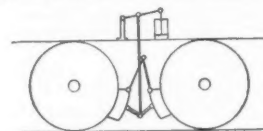


Fig. 1.

and that so perfect a type of this variety of brake was placed upon an engine at such an early day will, I have no doubt, be a surprise to many. A steam cylinder, set vertically upon the engine frame, operates a horizontal lever, to the free end of which is attached a vertical pull rod, operating knuckle-jointed levers from two shoes, both shoes being suspended from a single bracket upon the framing.

The brake shown in fig. 2 was patented by James Nasmyth in the year 1838. It was not a steam brake, how-

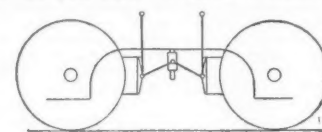


Fig. 2.

ever, and is given merely to show how early the crowd brake was taken up by these eminent engineers, and after a short experience abandoned.

In 1858 the crowd brake (fig. 3) appears upon a locomotive in England. This was a steam brake, having a horizontal

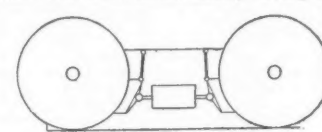


Fig. 3.

cylinder with two pistons. Steam was admitted between them, forcing them apart and so operating the brake blocks. But it, too, was soon condemned.

That these English engineers were right in their condemnation of this class of brake is sufficiently evident from mere inspection of them. Take for convenience the brake illustrated in diagram, fig. 12. This brake was patented by Mr. Clark in 1853. Consider for a moment the effect of applying, say 5 tons of pressure, between and pushing apart these

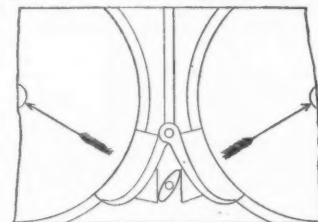


Fig. 12.

wheels. The first effect is to make a brake-shoe of each journal box, as indicated by the arrows on the figure. From this point the strain travels on through the box to the upward and outward corner of the pedestal of the engine frame. But the destructive effects do not stop here; their tendency is to force the frame and its burden downward upon the springs, so that during the application of the brake additional tension is imposed upon them, and if, while in such condition of extra tension the engine passes over a bad rail joint, what wonder if a broken spring is the result? Then again the thrust of the brake-shoes between the wheels causes rapid wear on that side of each journal-box where the strain is concentrated. When this wear has taken place the tendency of the brake is to force the wheels farther apart than the outside coupling rods can allow them to go, and an application of the brake at high speed, with the journal-boxes in such condition, has been known to result in stripping the rods from the engine or breaking a crank-pin or axle-box. If nothing is broken the wheels must skid, being locked by the inability of the coupling rod to pass the centre. This skidding is often mistaken for an evidence of brake

power, but is, in fact, proof of inefficiency and bad mechanics.

From the consideration of the crowd brake we pass on to the pull brake, illustrated in diagram by fig. 4. This

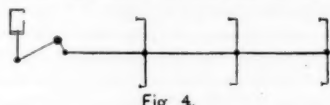


Fig. 4.

illustration, made from an old English patent, closely resembles a similar brake, that illustrates the proceedings of the Master Mechanics' Convention for 1886, and which was recommended by the President for adoption, principally, because it now has no patent upon it, and is public property. Any brake constructed upon this principle is worse than worthless. The brake cylinder transmits its power through a bell crank lever, which operates the pull rods, and is fulcrumed upon the frame. The shoes are suspended from the frame upon shoe levers, and with the exception of the first pair are worked by brake beams, all rigidly fastened to the pull rod; therefore if the first pair of shoes come to a bearing before the others they take the full force of the brake and the others do no work at all. Besides this, all the strain of the shoes is thrown upon the frames, in the direction of the arrows, and becomes proportionately destructive to all in its course.

Fig. 5 is an early and almost perfect example of the squeeze brake for cars. It was patented in the year 1853 by

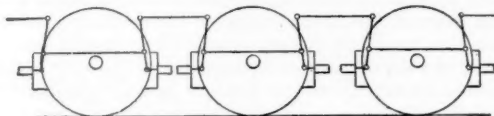


Fig. 5.

Mr. Johnson, and there has been no better foundation brake than this produced in modern times. It is perfectly interfulcrumed, but being a beam brake, it is not applicable to engines without considerable modification and invention.

The more we consider brake requirements the more we will be convinced that the squeeze principle is the only one upon which it is possible to construct a brake that will fulfill these conditions; the only one in fact upon which it is possible to construct a brake of maximum efficiency.

This fact may be further elucidated by following up this question of maximum efficiency. Take, for example, a consolidated engine, weighing, with its tender, 88 tons, of which 60 is on the engine wheels and 28 on the tender wheels. By our rule of maximum efficiency we require a 70-ton brake for such an engine. As we require to put 6 tons upon each wheel, in order to get our 60 tons of pressure on the engine, it becomes evident that we cannot obtain the maximum efficiency with a one-shoe brake. No one would dare to put 6 tons of pressure on one side only of a driving wheel; hence we deduce the axiom, "all brake shoe pressures should be counterbalanced by an equal brake shoe pressure upon the opposite side of the same wheel." There is no other practical way of constructing an efficient brake for such an engine as we have under consideration, for nothing less than 6 tons to each drive wheel is capable of giving the maximum usable power of control. That such control can be obtained is beyond question. I have seen such brakes in successful operation, with a squeeze brake upon every wheel, including engine truck.

It is said that truck brakes assist derailment; but on what ground is this opinion founded? The engine truck carries a respectable portion of the total weight of the engine, and if you want an effective brake, it is bad engineering to refuse this available hold without good and sufficient reason; at all events the objection should rest upon something more tangible than supposition. Has a car ever been thrown from the track because the brakes were on the forward truck? A rigid brake applied while upon a curve might have a tendency to assist in derailment; but if full power and counterbalancing brake shoe pressures upon every wheel be important, interfulcruming is no less so, and it is strange that it seems necessary to insist upon so simple a proposition as that on a coupled engine every driving wheel should be subjected to the same amount of frictional service, and yet this simple rule has been widely ignored. Proof of this may be had almost anywhere in the United States. If there is one thing more than another that shows the wisdom of calling up the subject of driver brakes for the next Master Mechanics' Convention, it is the exhibition made by our truck lines of a crowd brake between two wheels only of a consolidated engine.

One of the first practical suggestions that arise from a study of the squeeze system is that it permits and demands a higher position for the shoes. Where the stress is all on one side of a wheel, as in one shoe brakes, the shoe must needs be low to protect in some measure the boxes and journals from its effects.

Another point for consideration in the construction of a locomotive brake is the position of the pull line, or the position that the pull rods should occupy. There is only one position that is available on all classes of engines, and that is behind the wheels and below the axles. Having fixed upon the position for the pull line upon both sides of the engine, the power must be shunted from it into the wheel spaces. The efficiency of the brake will depend largely upon the way in which this is done. In fig. 11 is an arrangement

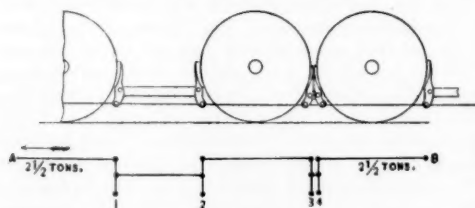


Fig. 11.

of pull line that introduces the floating lever, by means of which the power is interfulcrumed. These floating levers work in a horizontal position, behind the wheels and below the axles, and so operate the rock arms which carry the shoes, as shown in the elevation of this same figure.

If you will suppose this pull line to be anchored at B and that it is pulled at A with the force of 2½ tons in the direction of the arrow, then by tracing up the motion that would result, it is evident, that with piston strokes sufficient, it is possible to go on, indefinitely, coupling up wheels in this way and each shoe would get the same 2½ tons of pressure and there would be 2½ tons to anchor at the end of the series. All strains are equal and the adjustment is automatic, consequently the

maximum pressure can be used without fear of damage. But this is not the case with the pull line shown in fig. 7.



Fig. 7.

Notwithstanding it has floating levers and is interfulcrumed, it is founded upon the fatal principle that renders all this class of one shoe brakes impotent. It has to start with all its power upon its first pull rod, and is limited by this principle of construction to just so much strain as we dare put upon the framing of the engine. This in practice cuts down the efficiency of the brake to one-third of what it ought to be.

Mr. Howard closed with a few words about momentum brakes, expressing his belief that the difficulties of securing automatism in them are not only soluble but already solved.

Mr. R. W. Bayley, of the Westinghouse Air Brake Co., read

SOME NOTES ON THE BRAKE PROBLEM.

Within the year the Westinghouse Co. has supplied to the trade some 17,000 quick action brakes, about 14 per cent. of which were for passenger and the remainder for freight cars, with large additional orders yet unfilled. A large majority of the freight brakes are on orders from railroads that have not until now introduced them, which would indicate that the matter of handling freight trains with air brakes is growing in importance. Quite a number of lines, recognizing the value of the quick-action brake, as applied to passenger equipment, have substituted it for the old form entirely. Others have placed it upon all new equipment.

It may be said that no especial skill is required to handle the new brake that is not absolutely necessary with the older one; but it is essential that the operator understand the new order of things, an education easily acquired and well worth the trouble, in view of the superior merits of the new brake.

From the new engineer's brake and equalizing discharge valve, recently designed, those parts have been eliminated which have heretofore given any trouble, while none of their advantages have been lost. This valve practically makes the operator a piece of mechanism, and old and new brakes are operated therewith in a manner never before attainable without considerable personal skill from the engineer. The same may be said of the newer form of air pump governor, which, with extended use, has thoroughly demonstrated its eminent fitness for the purpose designed.

With regard to brake gear under cars, it can be said, and it needs but little investigation to verify the assertion, that the average existing brake gear is utterly inadequate to the duties imposed upon it, and it is to be noted with satisfaction that a number of railroad systems are alive to the necessity for a remedy, and are engaged in revamping their brake gear, and providing beams, levers, pins and connections that embody the proper amount of strength to resist deflection or stretching, making the brake-cylinder piston perform its legitimate duty of applying the brakes, instead of compensating for weakness of brake gear from stretching or springing. The maximum power attainable by the system with a given pressure is limited by the travel of the piston, and a large amount of brake power that might be otherwise had on the heavier class of cars is utterly lost through an almost worthless gear. Our recommendations in respect to levers and connections are embodied in a blue-print which we provide to those who wish our recommendations, and which have been designed to obtain a perfectly rigid structure under maximum stresses and a plus factor of safety to resist deflection or rupture. Due consideration was also given to future cost of maintenance in the designs referred to.

A prominent factor in the excellence of any brake gear is the character of the beam employed. Iron beams are coming into considerable prominence, and several roads have practically adopted them as their standard. We invariably recommend, in connection with our own iron beam, the large cast-iron shoe common to our form of beam, and which does not involve the use of a separate brake head, although the Christy brake head can be readily adapted to it.

Much interest is now taken in the application of brakes to six-wheel trucks. As trains of very heavy cars, with brakes applied only to eight out of twelve cars are now frequently run the possible brake power obtained is not up to its proper ratio to the weight of the train. The importance of braking all the wheels is becoming more generally recognized.

It is a fact not to be disputed that every vehicle in any train having power brakes should be capable of providing a brake power in exact ratio to its weight, in order that each may do its proper amount of work in bringing a moving train to a state of rest. As applied to freight cars, brakes are usually adjusted for the development of a fixed maximum power of something less than the light weight of the vehicle. Practically perfect conditions make it desirable to vary the power of the brakes in exact ratio with the load carried by the vehicle, so that a loaded car may be braked to the same percentage of the total weight as the empty one. The necessity for provision of this nature is made quite apparent when it is stated that there are in prospective construction freight cars of about 12,000 lbs. weight, with a carrying capacity of 60,000 lbs. The prevailing practice in attaching our brakes to such cars would provide a brake force of about 8,400 lbs., or 2,100 lbs. to each pair of wheels, a figure too low when the car is loaded to its capacity. We are, however, enabled to accomplish the desired variation in power by the use of truck levers provided with a sliding block at the fulcrum. The lever being attached to either the truck bolster or the car body, preferably the former, and partaking of its movement, provides automatically for a variation of the power of the brakes within the limit of motion of the car spring, and this motion may be properly multiplied for a great variation of effect.

Long experience in the use of driver brakes enables us to assert with much confidence that the reasoning that damage to the engine structure results from their use is most fallacious. They are an invaluable adjunct in train braking, and no damaging effects are noticeable in their use in conjunction with train brakes, as they should invariably be used. Brake shoes are now to be had that, as applied to driving-wheel brakes, admit of even greater mileage being obtained than even without driver brakes.

We have worked out a little problem in train braking, as applied to a given number of cars, and think you will find it of more than passing interest, as showing how the use of driver brakes, when operated in conjunction with train brakes, largely effects the distribution of the total brake power developed. It is an analysis of brake power existing in a passenger train, consisting of engine, one six-wheel truck baggage car, four four-wheeled truck coaches and two sleepers. The weights are assumed as follows:

	Pounds.	Per cent.
Engine.....	95,000	16.4
Tender.....	65,000	11.2
Baggage car and coaches.....	260,000	44.8
Sleepers.....	160,000	27.6
Total.....	580,000	100.0

Without driver brakes the maximum brake power developed by each vehicle is:

	Pounds.	Per cent.
Engine.....	20,000	6
Tender.....	216,000	66
Baggage car and coaches.....	90,000	28
Sleepers.....	326,000	100

Maximum brake power developed by each vehicle when the engine is fitted with driver brakes is:

	Pounds.	Per cent. of total pressure.
Engine.....	50,000	13.3
Tender.....	20,000	5.3
Baggage car and coaches.....	216,000	57.4
Sleepers.....	90,000	24.0
Total.....	376,000	100.0

Driver brakes are of many designs, with respect to the source of power for operating, number, kind and position of shoes and the arrangement of levers. Simplicity of arrangement, while of great importance, is secondary to the bearing they may have upon the character of the train brakes, and they cannot be safely depended upon in an emergency, if not operated in conjunction with train brakes. The fallacy of an emergency driver brake has been so often demonstrated that the subject need not be dwelt upon.

Driver brakes as provided by our company may be classed under various heads, as follows:

For 8-wheeled passenger engines there are the spread-brake, with the push-down piston and with the pull-up piston; and there is the clasp-brake. For engines having more than two pairs of drivers there are the spread-brake applied to two pairs of drivers; the same style applied to two separate pairs of drivers; single shoes applied to all drivers uniformly, pulling in one direction; the same as that last mentioned, with some of the shoes operating in the opposite direction; the clasp-brake, where its adaption to the engine is desirable. The design of the brake depends upon the wishes of the purchaser and its adaptability to the engine.

As applied to passenger engines, the earlier design of the spread-brake, operated by an upward movement of the piston, has been superseded by the push-down system, which eliminates the objectionable stuffing-box in the lower cylinder head, and is a decidedly better brake than the former style. This design is now almost wholly furnished for passenger engines. The clasp-brake is furnished to such as object to the spread-brake, but, as before stated, we do not think the necessity exists for correcting an imaginary evil.

The other classes of driver brakes referred to as applied to engines having more than two pairs of drivers are well known forms, requiring no special explanation to make their character clear. While we aim to simplify the arrangement as much as possible, the latter class, as made after our original designs, involved more or less complication of levers and connections that made their maintenance a source of greater expense than should be reasonably expected. This expense for maintenance, we believe, is now reduced to a minimum, by the use of the design commonly known as the "American outside hung equalized" form of the driver brake gear, which we have adopted in preference to our own designs as applied to engines with more than two pairs of driving wheels, and operated by compressed air. Large numbers of brakes of this class are being sold. It is a singular fact that engines to-day are not designed with any view to readily adapting driver brakes to the wheels without complication in some parts of the brake apparatus, and in consequence we are called upon frequently to design brakes where the wheels are located so close together that it is almost impossible to devise an arrangement that does not present some serious objection.

Mr. Bayley was followed by Mr. J. E. Loughbridge, of Philadelphia, who read a description of the Loughbridge freight train brake, which was illustrated and described in the *Railroad Gazette*, Aug. 26, 1887. By that device straight air is used, and it acts through two cylinders of different areas. The object is of course to get brake pressures varying somewhat with the loads and by the use of two cylinders pressures of three degrees are obtained, accordingly as the larger cylinder is used or the smaller, or both together. The change from one cylinder to the other is accomplished automatically. Mr. Loughbridge presented the advantages of graduated brake pressure and of the use of straight air, and concluded by saying:

"We expect in the very near future to invite you to an exhibition of a long freight train operated by our system, with a few empty cars in train, but as the normal condition of freight trains is or should be loaded, we will put in but few empties. Until our patents are all completed we dare not publish our entire system in detail. I would say, however, that we are backed by exhaustive opinions of leading patent law firms that we are perfectly free from any single or aggregations of patent claims."

In the discussion which followed the reading of the paper Mr. Sinclair spoke particularly of Mr. Howard's paper. He said: "I think it was a most exhaustive paper on brakes, and one which is very well worthy of the study of railroad men generally. The necessity of applying brakes to as many wheels in the train as possible cannot be too strongly urged on railroad men. The weakness of brake service to-day is in wheels running without brake-shoes being applied to them. However, I had to differ from him in his proposition to apply brakes to the leading wheels of locomotives. He held and argued that it would be practicable to apply brakes to the engine truck-wheels, avoiding all danger. My own experience of applying brakes generally to vehicles would lead me to doubt that there would be no danger there. There is a great deal of ignorance displayed in the arrangement of leverage of cars, and it would often be displayed in the leverage of engine trucks, too, and if a possibility of sliding these wheels was introduced there would be certainly a very imminent source of danger. I would be very strongly opposed to putting brake-shoes on the engine trucks."

About the brakes for freight trains generally, I think they have been making very fair progress during the last year or two, and so far as I could see, in the way of the practical working of the trains, there has really been no difficulty with it. The objection that Mr. Loughbridge mentioned, about the trains running into each other if the fore part has the automatic brake, I do not think applies very well. If you have say half a dozen cars in front and they break in two, or say you have ten in front in a long train and the train breaks in two where the braked cars are, the train is stopped. There is no chance of an opening being made.

If the train breaks farther back the engineer has entire control of the train and he can run away from it just the same as if he hadn't any brake.

I do not think that railroad men as a rule will care to sustain the position taken by Mr. Loughbridge against automatic brakes. I think they have got that pretty well worked into their minds, that an automatic system is a necessity and that a great deal of the safety of operating depends upon its being used. The remarks he made about the number of end collisions to my mind prove nothing. It merely proves that there are a great many trains standing around not properly flagged. Mr. Creamer, the inventor of the brake which bears his name, was present and took part in the discussion in advocacy of a brake independent on each car and to be worked by a bell cord from the engine.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

In our issue of Nov. 9 the fact was noted that the Vermont Railroad Commissioners in their annual report recommend a law similar to that of the state of New York, providing that stoves shall not be used in cars running in the state after Nov. 1, 1889. It is thought that similar legislation will be had in Minnesota at the recommendation of the Commissioners of that state, who have just issued a circular to the various roads in the state, requesting answers to a series of questions relative to heating and lighting cars. The circular is issued in accordance with the requirements of the general laws of the state of Minnesota, 1887, by which the Commissioners are instructed to make a report on the subject to the Legislature. The Michigan law of 1887, providing for safe heating, took effect the first of this month. Commissioner Rich, of that state, recognizes the practical difficulties, and has been very reasonable in his requirements. The railroad companies have been notified to remove all fragile stoves and heaters; but where the most approved hot-water heaters are in use the Commissioner will not order them out until it is demonstrated that there is something better to take their place. It is probable that there will be legislation on this subject in other states in the sessions of the coming winter, but it is not probable that commissioners so enlightened as those of New York, Massachusetts and Michigan will be found in all the states; it would be prudent, therefore, for the railroads to prepare, by experiment and investigation, for a change which is sure to come in time, and which they may be obliged to make soon.

The tables, which we publish from time to time, showing in detail the new track laid throughout the country, are invariably prepared from data received from officers of the various companies. Nevertheless, they must, in the nature of things, contain some errors—mostly errors of omission. The *Railway Age* points out some errors in the table of new construction for the first nine months of the year, which was published in our issue of Nov. 9. Some of these were errors of proof-reading, and some of misinformation or deficient information. For the corrections we are much obliged. Unfortunately, we cannot render a like service to our contemporary, for it still refrains from publishing any of the data from which its totals by states, and its grand total, are made up. In the absence of such data any discussion of the relative accuracy of the figures published by the two journals must sink to a mere matter of "claiming," after the manner of the politicians. Now, we claim nothing. We simply give our readers such information as we can gather, conscious of the fact that it is not absolutely correct, but confident that the inaccuracies are not great enough to be seriously misleading. It is unreasonable to suppose that on Nov. 2 the total new track laid up to Nov. 1 can be given accurately. It takes time to collect such a mass of information, and time to digest

and tabulate it. The mileage can seldom be got by states, and it often happens that the reports of two different officers of the same company do not agree. Reports of tracklaying in October, if sent in before the end of the month, must obviously be estimated and consequently liable to errors. Fortunately the practical usefulness of such statistics does not require absolute exactitude. They are published as news, and that people may be informed in a general way of the progress of railroad building in any given period and any given part of the country. When it comes to making maps and to writing history accuracy is essential, but in attaining the degree of accuracy necessary for these latter purposes time is an element. An experienced student of this subject can undoubtedly give round figures of totals of track laid by states as promptly as they are given by the *Age*, and give them with a probable error of, say, 5 per cent.; but there would be errors in detail, and it would be preposterous to use the totals as finally correct. The tables which we publish are designed to answer the same purpose as is served by the *Age's* totals, and further to inform engineers, contractors, manufacturers and investors, more in detail, of the work doing on individual lines. We take it that the historian and the map maker will not be satisfied to accept as final either our figures or those of our contemporary.

A Western railroad officer writing in reference to the editorial in these columns Nov. 2, on the elements going to compose demurrage charges, reminds us of our omission to touch upon the wrongs that shippers suffer at the hands of railroads, and which will certainly come into prominence just as soon as any systematic demurrage scheme is generally enforced. He adduces a typical case in his own experience. A car-load of coal recently shipped from a mine to a local station 140 miles distant, the whole trip being over the lines of one company, was eight days on the road, the average and reasonable time being, of course, less than two days. This delay subjected the consignee, a small dealer, to a loss, as purchasers who would have bought of him got their coal of another dealer. "Suppose," says our correspondent, "this same consignee should, while unloading his coal, be hindered twenty-four hours by his wagon breaking and he be subjected to a demurrage charge; he naturally feels that he has been unfairly dealt with."

We are not unmindful of this phase of the subject, as careful readers will recollect. A sensible suggestion for securing the rights of shippers and consignees in this matter was given in a communication to the *Railroad Gazette*, printed on Feb. 24 last, page 115. Customers have indeed suffered from poor service on the part of the railroads in this respect more or less in the past, and do suffer now. A certain small percentage of shipments are constantly delayed, and it is not always the dilatory consignees who suffer. If the inconvenience occasioned by cars detained three or four days on a trip of 1,000 miles by reason of hot boxes, broken draw gear, shiftlessness of yardmasters, etc., always fell upon those consignees who are slow in unloading, it might with some reason be assumed that both sides already receive substantial justice, and that, therefore, no change is necessary; but, unfortunately, things are not so nicely balanced. The slow consignees perhaps have very little complaint to make of slow transportation, while others, who make no trouble for the roads, have cause for much complaint of slow time. The only equitable remedy is to pay for errors or carelessness on whichever side the fault lies. Although bills of lading are carefully framed to stave off claims for delay, and claims for losses of this kind are not often entertained, at least in a direct way, consignees have doubtless nevertheless received a great deal of compensation, first and last, from the railroads for delayed freight, especially where competition has been sharp. At all events, the roads have been put to much expense in this line. The extra efforts made to hurry cars through for customers who threaten to patronize a rival line often are, in effect, important favors to the consignee, which are granted at considerable cost to the railroads. But of course railroads ought to perform this good service for all alike, and not for the big or the aggressive shippers only. Our correspondent need have little fear of added injustice, however. Any fair-minded superintendent would be careful not to insist upon demurrage against a consignee who could retort with a just claim for six days' delay; and those who are not fair-minded doubtless deserve to have suits begun against them for delays already suffered, to say nothing of future perplexities. Bills of lading stipulate that the road will transport the goods "with as reasonable dispatch as its general business will permit," and this fairly implies that unreasonably slow dispatch, not

caused by the general business of the road, is a failure to carry out the agreement. Cars of coal that spend 192 hours in traveling 140 miles are generally impeded by something other than well-conducted "general business," and some consignee ought to have the courage, patience and money to test the question more thoroughly than it has ever been yet.

The Chicago Car Service Association, the organization lately formed in that city for the purpose of abating the rolling storehouse evil, finds a big task on its hands, as was, indeed, to be expected. The customers of the roads there are wide-awake people, and there are a great many of them. Their doubts and objections have been presented forcibly and promptly. The placing of all the authority in the hands of an impartial commissioner is somewhat of an innovation in this branch of the business, and the fact that appeals from the commissioner must go to the superintendents instead of the freight agents is still more of a surprise. Various circumstances have caused delays. The Chicago & Grand Trunk has held aloof from the movement hitherto, but has now joined it, and the scheme has just gone into effect. The circular issued to consignees is such an improvement upon the brief and frigid style of document usually put forth when railroads have anything to say to their customers that we print it herewith in full. Dealings in which there are so many difficulties require much lubrication, and the conciliatory explanations of this notice will have to be amplified and reiterated over and over, but this is a good beginning:

Having in view the inconvenience and loss to patrons and railroads alike, consequent upon the inability to promptly provide cars requisite for the handling of freight, and believing that such trouble is mainly due to the delays in unloading and loading of cars, the railroad companies have resolved to make an effort to largely reduce, if not abolish, this evil. In their effort to accommodate their patrons, the railroads have permitted an abuse of their equipment, which has become intolerable. They fully realize that their own laxity of method is largely responsible for this abuse, and they desire, in applying the remedy, to exercise due moderation and give no occasion for complaint.

Notice is hereby given, that on and after Nov. 18, at 3 p. m., there will be made a minimum charge of \$1 per car per day, or any fraction thereof, for the use of cars not loaded or unloaded within 48 hours after being placed in position to load or unload.

(It should be understood that the foregoing does not change the amounts now being charged by Western roads on grain held on track for any reason.)

The railroads desire it understood in adopting this plan that the amount will not compensate them for the loss occasioned by the use of their cars and track for warehouse room, and that they will be best pleased when there is least to collect.

It is manifestly unjust that the shipper who has invested in real estate, warehouse, and other appliances, should have those advantages neutralized by the use of cars as a storage room by his competitor, who has not invested a dollar in similar facilities, and who, in tying up and rendering useless for long periods the railroad equipment of the country, contributes to a scarcity of cars, which injures not only the railroads but all their patrons.

That there may be no discrimination in the enforcement of the rules and collection of the charges herein announced, the entire matter has been placed in charge of an organization which will act for all interests alike.

A recent number of the *New York Evening Post* contains an article on The Supineness of Railroad Stockholders. It points out with great force the bad results of most of the attempts of railroad presidents to enter upon wars of conquest for the sake of new territory, and it calls upon railroad stockholders to put a stop to such wars, in which they are the heaviest losers. The article suggests the creation of a sort of advisory board to report on the merits of such disputes, and to bring public condemnation on the worst offenders. The idea is not without merit, but there would be great practical difficulties in applying it. Under the present joint-stock law of Germany such boards of control have a large place in manufacturing industry; but each concern has its own board, representing one particular set of stockholders. The effort to arbitrate between rival companies would give such a board a totally different character, and would probably make it necessary that it should be a public body. The *Evening Post* does not take this view of the matter, but we hardly see how it could be avoided. Such a board would have powers not unlike those of the Massachusetts Commission in its earlier days. Most of the commissions of the present day are not so much investigating and reporting bodies, as administrative or judicial ones. As such they are in many cases doing an important work; but they are at the same time, almost of necessity, leaving another equally important work undone. Not merely railroad stockholders and financiers, but railroad officers of every class, would welcome the creation of a body which should do for the railroad interests of the country to-day what was done for those of Massachusetts by Mr. Adams and his associates fifteen years ago.

So important a matter as the instruction of trainmen by their superiors may, and probably often does,

suffer from being looked at too much from one side. Superintendents who might get responses from their men, and thus feel that teaching was being done, content themselves with the unsatisfactory position of the preacher or editorial writer, who fires his guns in the air, seldom knowing what effect his shots have. Probably this arises largely from the fact that most trainmen are not skillful talkers; their good ideas suffer in delivery. The superintendent decides upon the needs of his men without consulting them, and this because he feels that consulting would do no good. But 99 conductors who won't talk furnish no excuse for neglecting the 100th who will. There is all the more need of fostering him, for he represents a large class that would otherwise be unrepresented. These considerations lead us to publish the letter of "Langdon" on another page. We print it because it comes from a practical man. A trainman who can so clearly set forth his case deserves a hearing. Intelligent trainmen of this kind who become trainmasters and superintendents unfortunately come under other influences after their promotion and generally fail to grasp the case so well; at least, it so appears if we may judge by actions.

It is a fact that many superintendents are just waking up to the questions referred to, and also that many are still, to all appearances, sound asleep. Our correspondent should remember that the present change is not really from an old code to a new one, but rather from no code to a code. This is substantially the case in the worst instances and partially so in most. This explains the recognition of the value of teaching which is now seen for the first time in so many quarters.

Whether or not *Engineering's* diagnosis of the accident to the train of the Czar, in Southern Russia, is correct, it is plausible. The accident took place Monday, Oct. 29. The train consisted of 19 cars of different classes, hauled by two heavy locomotives. While running 43 miles an hour, down grade, a car was derailed and the rear portion of the train was badly wrecked. Twenty-one of the imperial suite were killed on the spot and 37 were badly injured, of whom one has since died. It is impossible to say what was the immediate cause of the derailment, but *Engineering* assumes that at bottom the difficulty came from fast speed on a slow track. The South Russian roads are laid with 66-lb. rails and "are notoriously badly kept." The customary speed of the mail trains is 20 miles an hour, including stops, and on the best line in Russia the ordinary speed of passenger trains is said to be 15 miles an hour. As traffic is thin, as well as slow, the statement that the track is not kept up to a high standard is probable enough, and the fact that the Czar picked up a piece of a rotten tie at the scene of the accident makes it still more probable. Given, then, light rails and bad track, with a heavy train running down grade at 43 miles an hour, and it seems superfluous to spend much time looking for what actually broke. It would have been strange if something did not break. *Engineering* suggests further that the cause of this disaster may be advantageously studied in other parts of the continent. There has been in continental Europe a steady increase in weight of rolling stock and in speed, without a corresponding increase in the weight of rails, and the consequence is that "modern trains run on antiquated track." A well informed engineer writes us that accidents from defects of track are numerous in Germany, but are little heard of, while in France accidents from the same cause are also frequent. The grim nickname of the Paris, Lyons & Mediterranean, "Pour La Morgue," may have another basis than the tempting collocation of initials. The same engineer says that although half the railroads of France are laid with rails of the bull head section, "neither section nor weight has been changed for years, so that these roads have become as shaky as those with flange rails." The Czar's accident carries the same lesson for us that it has for the railroads of continental Europe. Fortunately, our engineers and managers not only appreciate the importance of heavy sections, for economy and for safety, but in recent years have been able to steadily increase the weight of rails, and to-day the tracks of the Reading with 90-lb. rail, the Pennsylvania with 85, the New York Central with 80, the Erie with 76, and many others with sections of about the latter weight, on our closely spaced ties, are probably as stable as any in the world.

Tramps and Train Wrecking.

The fight with a score of tramps which a Boston & Albany station agent and freight crew had last week, calls increased attention to a state of affairs which is a constant menace to the safety of railroads and em-

ployés, and which must sooner or later be met by more vigorous measures than have yet been adopted. This Massachusetts incident will remind Eastern managers, if they have not discovered the fact before, that the lawless element is not all "out West" by any means. Trainmen in New York and New England, as well as in the West, could doubtless give some pretty large totals if they were to tell of all the tramps that ride on their trains and all that try to and fail. Every month our accident list records the death of several tramps, and a perusal of it gives the impression that hardly any serious freight wreck occurs without killing or maiming a number of these vagabonds, who are concealed in or between the cars. Within a few months four or more at a time have been thus killed on different occasions, and in one case six were suffocated together in an overturned car of grain. Passenger trains are also haunted. A Connecticut superintendent tells of a recent persistent attempt of three fellows to crawl upon the trucks of a car in a fast express for a 25-mile ride. The reason that these hordes are so large and are met with so constantly and over such a wide territory is undoubtedly to be found in a feeling of timidity among trainmen. Some conductors are indifferent to the presence of the intruders and to the rules requiring their expulsion, and others are doubtless bribed, by cigars or favors of some kind, to wink at their presence on the train; but the fact remains that however strictly a conductor may be disposed to enforce his orders he often fears to take severe measures lest the criminal take revenge by train wrecking or some lesser crime. This is especially true if the conductor is wholly unarmed or the gang of tramps outnumbers his force of helpers.

Attempts at train wrecking are constantly reported in the press dispatches and most of them can be attributed to no probable cause. In the last three months there have been a score or more of ineffectual attempts, in addition to the successful instances shown in our accident record, and attacks upon passenger trains by stone throwers are also frequent. The last named species of devilry is perhaps done by boys oftener than otherwise, and placing sleepers on the track, misplacing switches, etc., cannot always be laid to tramps, by any means; but all these forms of lawlessness, together with thefts from freight cars, etc., are to be cured, if at all, by the same general means, and we therefore class them in one category.

Repression of this danger is not to be accomplished without considerable expense nor without the backing of a strong public opinion. Costly train accidents resulting indisputably from the causes under consideration are not frequent in any one section of country, and railroad officers have therefore not deemed it their duty perhaps to try to actively influence public opinion, but the principle remains that they ought to see that the real extent of the danger is known to the makers and executors of the law. Railroad managers realize the seriousness of the situation better than anybody else, and do an injustice to themselves if they wait until a specific horror comes home to their own road before bestirring themselves. Like all police protection, anything adequate to the present difficulty will be very expensive. In Massachusetts, where the recent outbreak has aroused considerable feeling, conservative observers are talking of the possible necessity of having the entire length of roads like the Boston & Albany regularly patrolled. The outlay involved in a plan of that kind is, of course, the explanation of the non-action of both the railroads and the municipalities. But something of the kind must come sooner or later, or we shall have a great train-wreck. Very bad disasters from causes which would have seemed sufficient only for a slight one are common. The miscreants who misplace switches, and set the light to show all clear, will some day kill a score of passengers instead of only one or two, as is generally the case.

Towns and cities are interested in this problem both as communities and as travelers upon the railroads. If the railroads were rid of the outlaws the shrinkage of their numbers would probably be real, and the towns would receive munimty at the same time. It is hardly to be supposed that such a roving and lazy class would permanently haunt any section of the country where they had to travel entirely on foot. There is no justice in letting the railroads fight these battles alone. The local government should do its duty without being asked. Railroad managers should boldly proclaim the facts, notwithstanding the liability of being accused of shirking a burden. The Boston & Albany made some big batches of arrests some time ago, and the Pennsylvania was lately reported to have bagged a large number of tramps on the line of the New York division, but the movement seems to have been only a

temporary outburst in both cases. The railroads should always co-operate and give all reasonable aid, but the main responsibility certainly is on the officers of the law. The railroads, notwithstanding their sins, already pay a great many damage bills that they would not be legally bound to pay, but they will have still more of them if train wreckers are not repressed. That the municipalities can exterminate these pests is probably not so impossible as it seems. Certain cities, and indeed whole states, have upon occasion risen to the emergency before now, and might again. At least it is high time some of them tried. In many states the present laws are sufficient if only they were enforced. A lesson or two from the centralized governments of Europe might not be instantly fatal to our republican institutions, and would do some good. A good preliminary move would be to pass laws authorizing tempting rewards to all officers, possibly to all persons, who should capture and convict a tramp. Something of this kind has been tried in Connecticut, we believe. The present season of the year is the time to attack the "fraternity."

Highway Bridges.

A pamphlet published nearly a year ago by Mr. J. A. L. Waddell on the subject of specifications for highway bridges and the methods of securing honest work in such structures was widely circulated and much commented upon at the time of its publication. The subject was taken up by the Engineers' Club of Kansas City, general discussion by engineers was invited, and a committee was appointed to co-operate with committees from other engineering societies with a view to formulating, if possible, some plan for concerted action. In the November issue of the *Journal of the Association of Engineering Societies* is published an abstract of Mr. Waddell's pamphlet, with a discussion by thirteen engineers of high standing.

In his pamphlet the author set forth with his customary vigor of language the need of some change in the existing methods of getting highway bridges built, and then discussed the following four methods of effecting the desired reform, viz.: 1. State inspection. 2. An association of highway bridge builders who would be bound by a heavy penalty to build no bridge that would not have the strength indicated in certain standard specifications to be adopted by the association. 3. County bridge supervisors to call for bids on the specifications contained in the pamphlet, and a specialist to examine the designs submitted, award the contract and inspect the bridge after completion; and 4. Having complete detailed plans prepared by a competent specialist. More than half of his pamphlet was given up to the proposed specifications, which were most elaborate and minute.

The engineers, whose expressions of opinion are printed in the *Journal of the Association*, agree in the general proposition that something ought to be done, and we are rather surprised to see how many of them think that a remedy for existing evils might be found in state control of some sort. No final action has been taken, we believe, in most of the engineering societies on the proposition of the Kansas City Club that they should co-operate in formulating legislation to secure state inspection or supervision. Committees in some of the societies have the matter still under consideration, and one or two have expressed themselves favorably to the principle of state control, and at least one has rejected that idea.

The engineers contributing to this discussion are unanimous against the suggested combination of bridge builders. It is not considered practicable to prevent underbidding, or scamping in material, or the use of improper influences with county or municipal officers, or otherwise evading or violating the articles of association. The remarks of Prof. De Volsen Wood on this matter are very true. He says "the evils of a community or of society are not removed by merely changing a system, and much less by shifting an organization. Any particular evil may be greatly modified and substantially removed by either of those methods, but new evils are liable to spring up which may be more burdensome and more difficult to remove than the former. Evils grow out of the selfishness of men, and the desire to make profits will be just as strong with an association of bridge builders as without, and if such an organization becomes successful it may be used to secure an unjust profit."

The discussion of Mr. Waddell's specifications commends them generally, as specifications, but the practical difficulties of agreeing upon and enforcing standard specifications become apparent whenever the matter is seriously discussed. The history of the past efforts in this direction demonstrates the futility of

attempts to make uniform specifications for all places and conditions. Mr. Chanute cites the case of the committee of the American Society of Civil Engineers, which after an existence of four years finally dissolved without having reached any conclusion, the members having disagreed on many points; and the discussion by the same society of the questions of a standard bridge floor and a standard rolling load settled pretty effectually the idea of general standards for those details of practice.

This latter discussion was had at the annual convention of 1887, and was part of the consideration of the general subject of inspection and maintenance of railroad structures. The first question presented in that discussion was "What measures, legal or other, can be taken to insure a proper inspection of railway bridges?" Most of the members of the American Society who attempted to answer this question recommended some form of inspection by the state, as most of the engineers taking part in the more recent discussion suggest legislation as a cure for weak bridges. We thought that the majority was wrong in 1887, and we see no reason for a different opinion now. It does not appear necessary, even if it be possible, to get good bridges by law. In this, as in other matters, a good fundamental principle to start on is that legislation which interferes with the free transaction of business between man and man is pernicious, and there seems to be no sufficient reason why that principle should be departed from in the matter of buying and selling bridges. It is not probable that state laws regulating this business would be any more wisely made than laws regulating freight tariffs or grade crossings; and the position of the agents appointed to carry out such laws would be one of extraordinary difficulty and temptation. One of the reasons often assigned why reputable bridge concerns cannot compete with what Mr. Waddell calls the highwaymen, is the corruption of county officers by the latter. But a state law or a state appointment as bridge inspector will not change the nature of man.

The legislation suggested as likely to insure safe bridges generally takes this form: That the state legislatures should prescribe a minimum strength for bridges of various classes, and provide for the appointment of engineers to examine and accept the plans and the completed structures. While we have no confidence that such laws would always or usually be wisely contrived or efficiently executed, there is a certain field for legislation that might profitably be occupied. It might well be provided by law that plans of all bridges of certain specified classes should be kept in accessible files, and that it should be the duty of some state officer to examine these plans and make public reports thereon. The great end to be secured is intelligent public criticism, and if that is secured the "enlightened self-interest" of which we hear so much may be trusted to evolve the best designs of bridges and the best methods of buying them.

Strong and Weak Roads Under the Inter-state Commerce Law.

Among all the trunk lines, the Pennsylvania has done relatively best under the Inter-state Commerce law; and the New York Central has probably done next best. The percentages of traffic carried by these roads are larger than they were under the pooling system. This has been constantly and markedly true of the Pennsylvania, and, in spite of recent fluctuations in west-bound business of the New York Central, it has been pretty steadily true of that road also. Nor is it surprising that this should be the case. If rates are made equal by all lines there will be a slight preference on the part of many shippers for dealing with the stronger corporation; and unless this is counteracted by differential allowances or by an arbitrary diversion of traffic, the results of any such preference cannot fail to make themselves felt.

Under such circumstances the agents of the weaker roads are under a strong temptation to adopt questionable devices for securing traffic. By false weight or classification, or by various other methods, it is easy for them to do this. Not that the strong roads are entirely free from such sins; but the temptation to such a course is much greater in the case of a road which is losing traffic than with one which is running ahead of its percentage. Thus it happens that the roads which gain most by the present state of things are not by any means satisfied with it. They believe that their rivals are doing a certain amount of rate cutting; and there is more sorrow in the New York Central over one car load that is diverted to the Erie by rate cutting than over ninety and nine which might be diverted to it under a pooling contract.

The general tendency of the strong roads has been to place rates so low as to leave the weak ones little margin for secret rate cutting and none at all for differentials. The Pennsylvania has kept east-bound rates much lower than the other companies would probably have wished; and the New York Central seems to be doing the same thing with west-bound rates. In this policy the strong roads find great help from the short-haul clause of the Inter-state Commerce law. If a road like the Pennsylvania leaves itself but a slight margin of profit on its through rates, a weaker competitor, with higher operating expenses, cannot afford to demand a differential which involves a reduction in local rates all along the line. To do business on such terms would leave it no money at all. Even if it tried such a policy, it probably could not maintain it for any great length of time.

This is the situation which our trunk lines seem to be approaching. In the Mississippi Valley systems the case is somewhat different. There we find a number of financially weak lines, recently built, which have comparatively little local traffic. In such cases, the short-haul clause hurts the stronger road more than it does the weaker. The possession of local traffic acts as a handicap in a contest for through traffic. The road which must reduce its rates all along the line loses far more than the one which has only the through traffic to consider. It was of this inequality that the Chicago, St. Paul & Kansas City complained in its recent case before the Inter-state Commerce Commission; and the fact that the Commission was unable to grant relief on the state of facts presented only adds to the difficulties under which we suffer.

Much is said in the newspapers about the recklessness of railroad managers just at present; but the effect of the Inter-state Commerce law has been to put such recklessness at a premium. The prohibition of pools enables a single short-sighted manager to force his policy upon all the others; the short-haul clause makes the effect of any such competition far more disastrous than it otherwise would be. The effects of this process are seen, only too clearly marked, in the reduced net earnings of many of our railroad systems. It is hard to see how we can avoid these financial losses by any means short of actual consolidation of rival interests on a larger scale than has been hitherto witnessed.

The funniest excuse for a collision yet heard of appears in the following press dispatch:

"THE BLIZZARD NO EXCUSE FOR A COLLISION.—The jury in the suit of Frank E. Pooley against the Philadelphia, Wilmington & Baltimore Railroad, to recover damages for injuries sustained in a collision at Clifton, Pa., on March 12 last, the day of the great blizzard, have returned a verdict for the plaintiff for \$9,000. The defense of the company was that the accident was unavoidable and due to an act of God; that the engine of the train on which the plaintiff was a passenger was frozen up and could not proceed; and that the engineer of the other train was unable to see before him on account of the snow in the air."

Lawyers indulge in all sorts of extravagances in talking to juries, and we can hardly believe that this was more than an "appeal" to the credulity of the jurymen; to offer a defense of this kind seriously sounds very absurd beside the confident assertions of the passenger advertisements. It was "too much" even for the reporter, as may be seen from his unfeeling head-line.

If the railroad company had boldly asserted that the passengers were so anxious to reach their destinations that the conductor felt bound to "push on" when it was almost certain that his engine would freeze up before a safe station could be reached; that the rear brakemen failed to place torpedoes sufficiently far back and to attach them to the rail with proper skill, because he lacked energy, and that yet he was the best obtainable man for that position; that the block system was only feasible on roads running 200 trains a day, and that 99 per cent. of American managers sustained this view, it might have been reasonable to expect some degree of mercy from the jury. If to this had been added the fact that a safe system might eventually necessitate an addition of a tenth of a cent a mile to the passenger fares the jurymen would have been condemned in their consciences whether they had owned up to it or not. But to lay the blame upon God when the trainmen are told that "nothing will justify a collision" is decidedly unfair.

Another narrow gauge road has disappeared. Last Sunday the 161 miles of the Cleveland & Canton were changed from 3 ft. to standard gauge. The company has been preparing for the change for some time. A third rail had been laid from Cleveland to Canton, 60 miles, and it only remained to make the changes in switch connections and side-tracks. On the rest of the road the outside spikes were driven to gauge. The change was made in about 10 hours by about 1,000 men, a large share of them being borrowed from the Pittsburgh, Cincinnati & St. Louis, the Cleveland, Lorain & Wheeling, the "Nypano," the Pittsburgh & Western, the Lake Erie, Alliance & Southern, the Cleveland & Pittsburgh, and the Valley railroads. D. M. Cary, the contractor on the Coshocton extension, was also on hand with all his employés. All the borrowed men were sent forward Satur-

day night, and were assigned for lodging and board wherever accommodations had been found for them. Most of the reinforcements were quartered in Canton and points south of there. On the main line men were lodged at Beach City, Dundee, Baltic and Coshocton, and on the Carrollton division at Minerva, Carrollton, Dell Roy and Sherrods-ville. The narrow gauge cars and engines were collected at Canton, where six miles of temporary track was laid, and a number of new ones of standard gauge, including 13 passenger cars, were ready at Cleveland. The first standard gauge train started from Cleveland at 11 a. m. Mr. W. M. Harsh, says a local paper, is one of the few men of the road who recollects when it was changed from standard to a narrow gauge. He is a native of Carrollton, and remembers when the road only extended from Carrollton to Oneida. He says: "It was 12 miles long, built of strap rails and had mules for motive power. Becoming ambitious the directors purchased a locomotive, the weight of which flattened the rails so they were worthless in about three trips. They then gave their right of way to a road called the Ohio & Toledo, the rolling stock of which was standard gauge. This company in turn sold the property to the Connotton Valley, which extended the line from Oneida northward to Canton, and from Carrollton south to Sherrods-ville. They substituted the narrow for the standard gauge, just the reverse of what I being done to-day over the same roadbed."

In the paper on maintenance of way, an abstract of which was published in our last issue, the author, Mr. Curtis, made the following statement concerning certain iron rails in the track of the Southern Pacific system: "There now is in track along one of our lines in Sacramento Valley six or seven miles of this old original chair joint pattern of iron rail, which has been in service for over 25 years, has carried a total traffic of over ten millions of tons, and is still in excellent condition; and when it is finally taken out, I suppose it will be not because it is worn out, but because we happen some day to have a little steel to spare and feel disposed to put an end to the noisy rattle of its joints."

The re-election of Mr. Peter A. Dey as Railroad Commissioner in Iowa is a matter for congratulation. He is said to be the first Democrat elected to a state office in Iowa since 1857. The contest between Mr. Dey and Mr. Machin, the Republican candidate, was very close, and at last reports it appears that Mr. Dey's plurality will be less than 700 in a total vote of over 400,000. Mr. Dey has refused to debate his office to political uses during the campaign, notably in refusing to be a party to rendering the opinion of the Commissioners in the case of the jobbers of Davenport and Burlington before the election. Naturally he must have had arrayed against him much of that element which is so bitterly hostile to the railroads in Iowa, besides being a member of the weaker party. Under these circumstances his re-election is remarkable, and is a lesson in political courage.

Mr. B. S. Church presented on Wednesday last his resignation as Chief Engineer of the new Croton Aqueduct. Mr. Alphonse Fteley, now consulting engineer, will succeed him as Chief Engineer, while Mr. Church takes the position of Consulting Engineer to the Aqueduct Commission. Mr. Church says that his resignation is not the result of public criticism, or of official differences of opinion, but is offered simply because he needs rest. He has been more than thirty years in the service of the city.

The Baltimore & Ohio has put on a train to run from Philadelphia to Washington in 3¼ hours. The quickest train by the Pennsylvania now makes the run in 3 hours and 22 minutes. The distance by the two routes is almost exactly the same, but the boat transfer at Baltimore, together with other slight disadvantages, will make it necessary for the Baltimore & Ohio train to travel considerably faster than its competitor.

NEW PUBLICATIONS.

Time-Table, with Notes, of "The Burlington's Number One."

This is the title of a pocket pamphlet written by Ernest Ingersoll and published by the Chicago, Burlington & Quincy Railroad, giving the time-table of that road's best through train from Chicago to Denver and Cheyenne, accompanied by copious wayside notes of such matters as would naturally interest the intelligent and inquisitive passenger. The columns for time and distances are at the left of the page, and descriptions of towns, natural scenery, connections with other railroads and other useful information are given alongside in proper order, commencing at Chicago and working westward. The feature of the work is the clearness with which the information is given. The average passenger is afflicted with more than ordinary dullness of intellect in many respects when he is far from home, and it is therefore impossible to make the answers to his questions too plain and simple. Of course the scope of a work of this kind is illimitable, and it would probably be easy to detect omissions in its make-up; but the whole world cannot be described in a dozen pages, and the chief regret of the traveler after using this handy little pamphlet will be that similar itineraries are not furnished for all journeys. For, in fact, such a well-equipped train, making such a long journey, is just the one which least needs an explanatory document of this kind. What the public would like is an equally good guide for the roundabout journeys which have to be made over obscure roads, where trains are infrequent and the junctions and connections are undiscoverable. The Burlington's book has an artistic front cover, but the back side is disfigured by a

tremendous perspective which makes an ordinary train of nine cars appear to be 2,000 feet long. The rear vestibule shows up in fine shape, but the engine is the size of a small mouse.

A Collection of Statistics to the close of 1887, relating to the Iron and Steel Industries of the United States. By James M. Swank, American Iron and Steel Association, Philadelphia. Price, \$1.00.

This is a pamphlet of 24 pp. which is regarded by the author as being in all respects the most valuable statistical publication that has ever emanated from the office of the Association. It contains a collection of the statistics of our iron and steel and coal industries for many years down to the close of 1887, embracing both production and prices; also tables showing the production of iron ore, coal, pig-iron, and steel in Great Britain and other countries in late years; also statistics of immigration into the United States, railroad construction in the United States and other statistical matter in tables covering many years.

The August issue of the *Transactions of the American Society of Civil Engineers*, which is just out, contains the full text of the address of President Thomas C. Keefer on the Canadian Pacific Railway, an abstract of which was published in the *Railroad Gazette* of July 6, 1888, and which attracted very wide attention. It is accompanied in the *Transactions* by a general map of the line, maps of portions of the mountain sections, and a profile of the line between Calgary and Sicamous, showing all the heavy grades between the Atlantic and Pacific. There are cuts showing various types of snow sheds, a plan of a standard divisional yard and other interesting illustrations. Altogether the paper forms a monograph of great value and remarkable interest.

TECHNICAL.

Locomotive Building.

The Lake Shore & Michigan Southern will receive bids for three express passenger locomotives of the same pattern as the Brooks locomotive which was illustrated in the *Railroad Gazette* of Nov. 16; also for seven switching engines and fifteen moguls.

The Chicago, Burlington & Quincy has ordered 15 new locomotives of the Rhode Island Locomotive Works. The Cooke Locomotive Works, of Paterson, N. J., have just completed a number of mogul and passenger locomotives for this road.

The Union Pacific let contracts last week for building 50 new locomotives. The order was divided between the Schenectady Locomotive Works and the Rhode Island Works (25 to each). The engines will be of the Union Pacific standard eight-wheel pattern, Otis steel being used throughout.

The Duluth, South Shore & Atlantic, has received nine freight locomotives from the Baldwin Works, and the remaining six to complete the order will be delivered in a few days. Fifteen passenger engines, built for this road by the Baldwin Works last summer, are now in service.

The Old Colony will soon commence work on four 18 x 24 standard passenger engines. Mr. J. N. Lauder, Superintendent of Rolling Stock, has been engaged in overhauling and repairing a large number of the Boston & Providence engines, and has put the extension smoke arch on several of them.

Car Notes.

The Chicago, St. Paul & Kansas City is asking bids for 1,000 freight cars.

The Union Pacific has placed an order for 2,150 freight cars. Of these 1,000 were box, 600 coal, 300 stock and 250 refrigerator, distributed among the car building companies as follows: Michigan Car Co., of Detroit, 650 box and 250 refrigerator; Peninsular Car Co., of Detroit, 350 box, 300 stock and 450 coal; Wells & French Co., of Chicago, 150 coal cars.

The Kansas City, Fort Scott & Memphis last week let contract for 300 new box cars. The building of 150 of these was awarded to the Pullman Co. and of 150 to the Wells & French Co., of Chicago. The contract for 20 new car bodies was let to the Kansas City Car Wheel Co.

The Wason Manufacturing Co., of Brightwood, Mass., has received an order from the Old Colony for 25 passenger cars, "to be the finest in New England."

The Keith Manufacturing Co., of Sagamore, Mass., is building 50 box cars and repairing 50 freight cars for the Old Colony. The company is also engaged upon an order of 25 platform cars for the Boston & Maine of the same pattern as the lot of 200 recently delivered to this road.

The Marietta & North Georgia has recently let contracts for 200 standard gauge cars.

The Barney & Smith Manufacturing Co., of Dayton, O., has recently completed seven new drawing-room cars for the New York & New England. Each car is 59½ ft. long, 10 ft. wide, 14 ft. in height from top of the rails, and is carried on two four-wheel trucks with 38-in steel tired wheels. The exterior of the cars is painted the New York & New England's standard color, Tuscan red. The French elliptic springs and Ross-Meehan brake shoes are used.

Four electric cars are being built by the Newburyport Car Manufacturing Co., of Newburyport, Mass., for the Thomson-Houston Electric Co., two for the Newburyport & Amesbury road, and the others for the Bangor Electric Railroad.

President J. W. Sprague, of the Ohio Falls Car Works, having retired Nov. 19, the following management has been announced by his successor, Jacob I. Smyser, of Louisville, Ky.: President, J. L. Smyser; Vice-President and General Manager, M. E. Duncan; Secretary and Treasurer, J. D. Stewart; F. H. Duesler, Auditor; L. G. Matthews, Contracting Agent.

Bridge Notes.

The works of the Decatur Iron Bridge & Construction Co., situated on the Tennessee River, at New Decatur, Ala., and at the intersection of the Richmond & Danville and the Louisville & Nashville, is offered for sale. The works comprise 15 acres of ground, a main building 90 by 300 ft., with two L's 60 by 75 ft. each, with all necessary machinery for the carrying on of the business of bridge building and iron construction. Address Edwin Thacher, Trustee, Decatur, Ala.

Work has been resumed on the Wesley lakes iron bridges, connecting Asbury Park and Ocean Grove, N. J. A con-

siderable portion of the iron has been put in place on the bridge at the intersection of Emory street and New Jersey avenue, and the piers put in place on the Heck street bridge. The stone approaches for both bridges are now complete, and the work is to be pushed forward rapidly to completion.

Two piers of the new Kaw Bridge at Twenty-fourth street, Kansas City, Mo., have been completed and the work on the superstructure will begin next week. The bridge will cost \$65,000, and will be the finest bridge spanning the Kaw River.

The bridges of the Louisville, New Albany & Chicago over the two branches of the White River, near Indianapolis, are to be replaced by new steel and iron ones.

The Committee on Bridges of the city of Boston has reported in relation to the widening of the draws in the Neponset and Granite bridges and the bridges crossing Charles River, and make the following estimate of expenses: For Neponset Bridge, \$5,000; Granite Bridge, \$5,000, and \$1,000 for superintendence and contingencies, a total of \$11,000. The report states that the work shall be done on the bridges crossing the Charles River by the cities of Boston and Cambridge, before the first day of May, 1889. The estimate of expenses was as follows: Essex street bridge, \$7,000; Western avenue bridge, \$6,000; Cambridge street bridge, \$6,000; and North Harvard street bridge, \$9,000, which, together with 10 per cent. added for contingencies and superintendence, would make a total of \$30,800. The committee secured the passage of a bill petitioning the General Court for an extension of time in which the work of widening the draws of the bridges crossing Charles River to Cambridge is to be completed.

The contract for constructing a wrought-iron bridge near Canton, O., has been awarded to the Canton Wrought Iron Bridge Co. at \$2,960. The bridge is to be 53 x 50 ft. long.

The Jacksonville Bridge Co. has been organized with R. H. Mason, James P. Kelly and J. P. Parrott as directors, to build a bridge across the St. John's River at or near Jacksonville. The capital stock of the company is \$500,000.

The New York, Lake Erie & Western has just completed a new overhead bridge one mile west of Oxford, N. Y., on the Eastern Division.

The bridge being built by the Northern Pacific Terminal Co. from the Albina ferry landing on North Front street, Portland, Ore., out into Couch Lake, to furnish a public thoroughfare around the system of tracks to be laid by the company on its terminal grounds, is rapidly approaching completion.

The following proposals have been received by A. E. Rogers, Clerk of Chouteau County, Dak., for building two bridges near Fort Benton: Milwaukee Bridge Co., Milwaukee, Wis., two bridges complete, \$9,333; approaches, \$16.45 per lin. ft. Smith Bridge Co., Toledo, O., two bridges complete, \$12,600. San Francisco Bridge Co., San Francisco, Cal., two bridges complete, \$10,400; approaches, \$5 per lin. ft. Massillon Bridge Co., Massillon, O., for both bridges complete, \$9,631, \$9,215, \$8,949.

Manufacturing and Business.

The Fisher Foundry, Engine & Machine Works, at Pittsburgh, has received the contract for the 10-inch mill and the finishing shears to be erected at the new plant of the Minnesota Car Co., at Duluth, Minn., and the Lloyd Booth Co., of Youngstown, O., has received the contract for the erection of the 18-inch mill and the rail shears.

The National Tube Works Co., of McKeesport, Pa., has completed a contract for furnishing the Philadelphia Co., of Pittsburgh, Pa., with eight miles of 20-in. pipe, used in making another gas main from the Murrysville field. The contract required over 16,000 tons of iron, and the pipe was made in the company's 24-in. mill.

James Clark & Co. are operating a well-appointed factory at 1049 St. Louis avenue, Kansas City, Mo., under the name of Kansas City Brass Foundry & Electroplating Works, making anti-friction and babbit metals, car bearings, locomotive work, etc. They make a specialty of headlight and car work.

The St. Louis Iron & Machine Works Co. contemplates the reconstruction and enlargement of portions of its works, and also the addition of a large amount of new and improved machinery. The company has recently put in some new tools and will soon place further contracts.

The Richmond Standard Spike Works, of Richmond, Va., have contracted with M. V. Smith, of Pittsburgh, for the construction of a small rolling mill, spike machines and a regenerative gas furnace, with a capacity for melting 40 tons of steel per day. The firm will make all the iron used in the manufacture of their spikes. Work on the contract has already been commenced.

The West Jersey Construction Co. has filed articles of incorporation in New Jersey, with a capital of \$25,000. The incorporators are William S. Scull, William T. Bailey, J. Willard Morgan and others. The objects of the company are the construction and equipment of mills, factories, foundries, railroads, tramways, wharves, piers, docks, etc.

Phillips & Davies have just completed the erection of a plant at Wampum, Pa., and will engage exclusively in the manufacture of railroad spikes. The works are already in operation.

An incandescent light plant is being put in operation in the general office building of the Kansas City, Fort Scott & Memphis, at Kansas City.

The Rotary Steam Snow-Shovel Co., of Paterson, N. J., has just completed a new snow-shovel for the Duluth, South Shore & Atlantic.

Twenty sets of locomotive frames are to be built by J. A. & W. A. Chesley for the Canadian Pacific.

The Wilson-Snyder Manufacturing Co., of Pittsburgh, manufacturers of pumping machinery, have purchased the old Siemens-Anderson Steel Works property in Pittsburgh for \$85,000. The erect on of a new plant has already been commenced. The main building is to be of brick, 160 x 50 ft., and will be used as a warehouse, pattern shops and drawing-rooms, and will also contain the offices. A wing, also of brick, 60 x 60 ft., will contain the pipe-fitting shop, brass foundry and brass-fitting shop. A brick building, 200 x 80 ft. and 45 ft. in height, will be built, to be used in the manufacture of direct acting and duplex steam pumps. It will be equipped with a large traveling crane and improved machinery. These buildings are expected to be ready for occupancy by March. About 300 men will be employed in the new works. The firm also contemplates the erection of an iron foundry on the same lot in about a year.

The adaptability of indurated fibre seems only limited by the enterprise of the manufacturers. Mill roving cans are now offered by the Union Indurated Fibre Co. These are described as light, strong and having the well-known characteristics of the ware. They are in use in some of the Eastern mills and giving excellent satisfaction.

The Tanite Co. is offering an emery oil stone, of which two grades of these stones are made, one for putting on a rough edge, and one for a cutting edge on fine tools. The rough edge stone will do the same work that a grindstone will.

Iron and Steel.

The Pennsylvania has made arrangements for its supply of steel rails for 1889. It has agreed to take 45,000 tons from the Cambria Iron Co. at Johnstown, Pa., the Pennsylvania Steel Co. near Harrisburg, and the Carnegie Works at Pittsburgh, each company supplying one-third of the amount, and the price is reported to be \$28 per ton upon delivery, at stated periods during this winter and next year.

The rail department of the steel mill of the Bethlehem Iron Co., in Bethlehem, Pa., started up last week after several weeks' idleness. Work has also been resumed in the converting department, and all departments of the mill are now in full operation.

The Fort Pitt Boiler Works of D. C. W. Carroll & Co., at Pittsburgh, Pa., were sold at auction last week to Carnegie, Phipps & Co. for \$21,000. By the terms of the sale the purchasers assume a debt of \$37,000 against the property, which, with the \$21,000, brings the price up to \$58,000. The property was appraised two years ago at \$150,000.

It is reported from Pittsburgh that Abraham Reese has organized a company which will erect a large steel plant at Hartford, Ind. The mill will use patented processes owned by Mr. Reese. It is said that there is abundant natural gas at the mill site. The majority of the stockholders are residents of Indiana.

The Clymer Iron Co.'s large furnace at Temple, in Berks County, which has been out of blast for several months, resumed this week with a full force of hands.

The contract for furnishing castings for the new steel works at Latrobe, Pa., has been awarded to Charles L. Tittle, of Blairsville, Pa.

The 500 puddlers at Jones & Laughlin's iron works struck last week against a change in working hours made necessary by the scarcity of natural gas during the day time. At the mills of Oliver Brothers & Phillips and Wharton & Co. the men have agreed to work the new hours until arrangements can be made for a large supply of gas.

The Beaver Falls Rolling Mill, at Beaver Falls, Pa., was burned last week. Six men were burned, two perhaps fatally. The fire was occasioned by experimenting with Lima oil in generating gas.

The Lake Erie & Western is reported in the market for 4,000 tons of steel rails, to be delivered early in 1889.

The Bessemer Iron & Steel Co., of Bessemer, Ala., has issued \$500,000 of bonds for building its two iron furnaces, upon which work has been commenced.

The North Chicago Rolling Mill Co. is now running 14 boilers at its South Chicago Works exclusively with oil fuel. The tests have not yet been completed, but thus far the results have been satisfactory.

The Philadelphia & Reading Coal & Iron Co. will resume work at its large furnace at Bechtelsville, Pa., which has been idle for some months. Other of the company's furnaces will resume work as fast as they can be repaired.

The Tyrone Iron Co.'s plant at Tyrone, Pa., has been shut down for the purpose of rebuilding two regenerative gas furnaces. The company is also putting up a new building, 60 x 35 ft., over the gas producers, and building an entire new wing to the dam 120 ft. long.

The Cleveland City Forge & Iron Co., of Cleveland, completed last week the last piece of the ponderous machinery built by them for the steamer "Paritan," of the Fall River line. It is the connecting-rod, weighing, when finished, about 21 tons. It is 40 ft. long.

The Chief of Ordnance of the U. S. Army has been directed to invite proposals for all material required for the steel forgings for heavy ordnance. The proposals call for 25 sets of steel forgings for 3.2 in. guns; forgings for 1 12-in. breech loading rifle; 27 cast-iron bodies for 12-in. mortars; 27 sets of steel forgings for hooks and breech mechanism; 12-in. mortars; for furnishing, assembling and manufacture of 27 breech loading mortars and for complete sets of forgings for 8-in., 10-in. and 12-in. guns. The number of the class of forgings last mentioned is not specified, but the total price to be bid is about \$1,455,000. The number of sets of the steel gun forgings must not be less than 21 for 8-in. calibre, 22 for 10-in. and 14 for 12-in.; any increase proposed by bidders in the number of sets to be furnished will be evenly distributed. Bids for the gun forgings are to be opened Dec. 20; for the manufacture of mortars, for steel forgings, for hoops, etc., of mortars and for cast-iron bodies of 12-in. mortars on Dec. 15, and for the 3.2 in. forgings and single 12-in. forging on Dec. 11.

The foundation of the United States Rolling Stock Co.'s new foundry, at Anniston, Ala., 200 by 125 ft., has been laid. This will be followed by the rolling mill, the car shop, which is to be nearly 1,000 ft. long, and the other new buildings, for which the ground is being cleared. By early spring the new buildings will, it is expected, be all finished. The company has decided to build two large saw mills, one in Alabama and one in Mississippi, to cut timber from its own land for use in the car works.

The Rail Market.

Steel Rails.—The Pennsylvania this week placed its order for 45,000 tons of rails, divided between three mills on its line. The price is reported to be \$28. A contract is reported let in the West for 17,000 tons, half delivered at Kansas City and half at Omaha. On the Pacific Coast orders for 5,000 tons have been placed, and in the East orders for 4,000 tons. The market is firmer, with quotations at \$27.50@28. The report of the Board of Control shows that the deliveries up to Nov. 1 were 1,029,179 tons, the sales for 1888 delivery being 1,250,740 tons. For 1889 the sales are reported at 116,180 tons up to Nov. 1, but about 150,000 tons have been placed since then.

Old Rails.—Sales of 1,200 tons at \$23 on a Western Maryland road, and of 500 at \$23.50 from Bridgeport, Conn., delivered at Jersey City, are reported. The quotations for large lots are \$23@24.

New Car Shops.

The works of the Minnesota Car Co., which are now being built at West Duluth, Minn., will probably be ready for operation early next spring. The company expects to begin the delivery of cars next July. Work is now in progress on the stone foundations for the brick foundry, and many of the piers for the paint and the erecting shops are in. The paint shop is 56 x 360 ft., and the main erecting shop will be 93 x 526 ft. The foundry, 60 x 300 ft., will be stone and brick. On its south end will be a wheel pit 50 x 60 ft., and on the north end the pattern room, 30 x 60 ft. On the west side and at the northern end will be the boiler room, 26 x 35 ft. The brass foundry will be 18 x 30 ft., and the rolling mill will be 80 x 161 ft. In the rear of the rolling mill, at the north, will be the forge building, 70 x 100 ft., and in the rear of the forge building will be the gas producers and boilers, which will occupy a building 40 x 100 ft. The tracks through the property connect with the St. Paul & Duluth road.

General Manager S. H. H. Clark, of the Missouri Pacific, has entered into negotiations with the city of Atchison,

Kan., for the locating of the new shops of the company at that point. The city has offered a subsidy of \$100,000 for the shops, payable in bonds when they are completed. The company now has in operation at Atchison, a small plant employing 300 to 500 men when working to full capacity, but if the new shops are erected a new site on a tract of 97 acres, just west of the city, bought about three years ago for shop purposes, will be occupied.

The Buffalo, Rochester & Pittsburgh will build repair shops at Lincoln Park, N. Y., and is also building a new freight house at East Buffalo, N. Y.

The Wagner Palace Car Co. will build an addition to its Works at East Buffalo.

The Louisville & Nashville has resumed work on the immense shops at Decatur, Ala., suspended on account of the yellow fever, and the contract will be finished by spring.

Car Heating Notes.

The Chicago, Rock Island & Pacific, which has just opened its line through to Colorado Springs, Col., is now running steam heated vestibule trains between Chicago and Colorado Springs, Denver and Pueblo, and between Chicago and Council Bluffs and Kansas City. "The entire train is, every case is heated solely from the engine," says the announcement.

Superintendent Ewan, of the Indianapolis division of the Cleveland, Columbus, Cincinnati & Indianapolis, has established forenoon and afternoon schools at Indianapolis for the purpose of instructing the train men of the passenger service in the use of heating cars by steam taken from the locomotive. The entire passenger equipment of the road is now being fitted up at the several shops as rapidly as possible for heating by steam from the locomotive.

A Chicago Tunnel Company Incorporated.

The West Chicago Street Railroad, Tunnel Co., for which a charter has been issued, has an authorized capital of \$750,000. The stock has been subscribed for by J. Charles Morse, Warren F. Fairbeck, James F. Meagher, Charles T. Yerkes and F. S. Winston. The company is allied to the West Chicago Railway Co. It is intended to build the tunnel under the river somewhere between Madison and Twelfth street, already authorized by city ordinance.

The Grant Locomotive Works.

At a recent meeting of the Chamber of Commerce of Duluth, the secretary read a letter from the president of the Grant Locomotive Works promising before deciding on the new location of their works in the West to consider the advantages offered by Duluth.

Dredging Contract at Duluth.

Bids for dredging Duluth Harbor were opened in that city Nov. 13. The current appropriation is \$80,000. The lowest bidders, who got the contract at 15 and 15½ cents per cubic yard, were William Upham & Co., of Duluth. Other bidders were: C. S. Baker, Duluth, 16 cents; Brown & Gillian, Racine, 17 and 17½ cents, and Green's Dredge Co., Chicago, 20 cents.

The Hudson Suspension Bridge.

It is now the intention to complete the bridge over the Hudson between Anthony's Nose on the east and Fort Clinton on the west, within two years. It is to be built by the Hudson Suspension Bridge & New England Railway Company, of which Gen. Edward W. Serrell is President and Chief Engineer, and Mr. Wm. G. Ladd is Secretary. The address of the company is 38 Wall street. The clear river span is to be 1,625 ft., 163 ft. clear head room, and 195 ft. to grade line. The bridge is to be a suspended girder, the towers 327 ft. high, and the total length 2,850 ft. There are to be 12 cables.

From the eastern end of the bridge the railroad will extend to the Connecticut state line, and from the western end it will be continued to Turner's station on the Erie road. This involves a tunnel about 5,000 ft. in length through the intervening ridge known as Bull Hill, by which the grade of the connecting road will not exceed 37 ft. to the mile. The railroad connections are expected to unite all the great Pennsylvania coal fields with the New England railroads. Work is under way upon the foundations and upon Bull Hill tunnel. Col. Cook Talcott has the contract for the tunnel work. It is the plan of the company to build the bridge itself and not by contract.

Mineral Wool in Car Construction.

All of the new parlor cars lately put on the through express service of the New York & New England, between New York and Boston, have all the hollow spaces of the floors, sides and roof filled with mineral wool. All of the new coaches, some 18 in number, built at the company's shops in the last six months, are also packed with mineral wool, as a deadener of sound and non-conductor of heat.

New Ferryboat.

A new ferryboat for the Michigan Central has just been launched by the Cleveland Ship Building Co. She will be employed in transferring cars across the Detroit River between Detroit and Windsor, and with three tracks on the main deck will have a capacity for 21 cars. Her length is 280 ft. and she is 75 ft. wide over the guards. She will have four return flue boilers of 11½ ft., two double engines of 28 x 48 in. for each paddle wheel and two engines of 28 x 46 in. to drive a screw which is 9½ ft. in diameter. The boilers and all of the machinery will be under deck. The whole cost of the vessel is \$325,000. She is to be finished at Cleveland and is expected to be ready for service about the middle of next January. She will then leave Cleveland for Detroit regardless of the amount or thickness of ice on Lake Erie.

The Elevated to Try Electricity.

The management of the Manhattan Railway Company has asked the Julien Electric Motor Co. to supply estimates for the equipment of the Grand Central Branch of the Third Avenue road with electric motors. Col. Hain, when asked the reason for making any change in the present system, replied that while in a sense the move was experimental he hoped it was progressive, and was certainly made with a desire to facilitate travel.

Wheels on the Lackawanna.

It is stated that the management of the Delaware, Lackawanna & Western have decided to cease using 42 inch paper wheels under their passenger equipment, and adopt the 36-inch wheel as their standard. The reason a-sig-ned is that with the 42-inch wheels they experience a good deal of trouble from the springing of axles. Their passenger car wheels in the future will be steel-tired.

Montreal as a Seaport.

The official opening of the deepened ship channel from Montreal to Quebec took place last week. A clear water depth of 27½ ft. throughout has now been secured, "except at a few points which can be finished by the time of low water next fall." For many years the government has prosecuted this work, gradually increasing the depth as the transatlantic vessels have increased in size. From 1873 to 1887 the sea-going trade of Montreal increased from 412,478 tons to 870,773, and it is expected that next year the tonnage will be upwards of 1,000,000.

The Nicaragua Canal.

In the abstracts of consular reports appears the following from Consul Brewer at San Juan del Norte: Civil Engineer LeBaron and two assistant engineers are making the measurements and soundings about the harbor that are necessary to locate the site for the wharf previously mentioned. The wharf, as proposed to be constructed, is to serve as a wharf for the use of the construction company, but to be built at such a point, and of such material in part that much of that structure may be utilized in the construction of the breakwater, which will be an important feature of any plan for the improvement of the harbor of San Juan. While the superstructure of the wharf will be composed of wood the foundation will be built of solid stone-work. It is believed that there is a coral reef or bank that has been forming, and in a southwesterly direction in the sea front of the harbor. The exact location of the reef has never been determined. From statements made by commanders of the Royal Mail Steamship Co., and by the turtle strikers, I find that they believe that there is such a coral reef forming at some point in the sea coast between Harbor Head and Punta Castilla. One object of the party under Mr. LeBaron is to find the reef and decide if it is so located and of such bulk that it may be advisable to locate and construct the breakwater upon or over it.

The Rotary Snow Shovel.

The Rotary Steam Snow Shovel Manufacturing Co. has orders in hand now for 21 rotaries, of which 17 are actually building. All of these are for western and northwestern roads, except one which has been ordered by the New York Central & Hudson River Railroad. On the completion of these orders there will be in operation on the roads of the United States and Canada some 50 of these machines. If any reasonable doubts still exist as to the efficiency of the rotary they ought to be settled this winter.

The Detroit Tunnel.

The Detroit River Tunnel Co. has been incorporated, with a capital of \$1,500,000. The stock has been largely taken by Luther Beecher, of Detroit. The tunnel company will lease trackage to the railroads.

THE SCRAP HEAP.

Notes

The Nashville, Chattanooga & St. Louis has just had its trainmen examined for color blindness and defective vision by Dr. Dement, the State Examiner of Alabama. At Nashville, Tenn., one or two of the most trusted men were rejected.

The strike of brakemen on the Louisville, New Albany & Chicago was settled after two days' partial suspension of traffic by the company agreeing to pay through brakemen 2 cents per mile, and those on local trains 2½. The demand for a third brakeman on each train was dropped. The strikers indulged in some lawlessness at Lafayette, pins being pulled and rails greased. Several arrests were made. The business of the road was also interfered with at Lake, Ill.

It appears that the proposition to reduce wages on the Atchison, Topeka & Santa Fe was presented by the officers of that road to the engineers and firemen four weeks ago. A Kansas City dispatch of Nov. 17 states that the engineers and firemen there have voted to accept a reduction of 10 per cent. for four months. A committee from the engineers' and firemen's organizations, accompanied by an officer of the road, visited the various division termini.

The rumor that about one-third of the engineers who left the Chicago, Burlington & Quincy last March would make a concerted effort to get back at the old rates of pay is emphatically denied by the grand officers of the Brotherhood.

Telegraphic communication was held last Sunday between London, England, and Victoria, B. C., with only one re-writing of messages, that at New York. The occasion was the severe illness of Lord Ennismore at Victoria, whose physician wished to consult with a London doctor.

The Lehigh Valley Railroad has twelve trains equipped with instruments for transmitting messages by the Train Telegraph system.

The Mobile & Ohio has nearly completed machine shops and an engine house at Murphysboro, Ill., for the St. Louis Division. The company has just let the contract for a fine depot to Schaffer & Patterson, of St. Louis. The building will be of brick, with stone foundation, and of cut stone up to the window-sills. It will be 78 ft. by 22, besides an L front porch projecting. There will be four offices in the second story, over the depot, which will be occupied by the train dispatchers, roadmaster, trainmaster and building brigdemaster. The new depot when finished will cost between \$5,000 and \$10,000.

Kentucky Railroads.

The State Railroad Commissioners have just completed their assessment of the railroads in Kentucky. The report shows a total mileage of 2,371½ miles, an increase of a fraction of less than 400 miles. The total valuation of the roads is \$39,863,285, being an increase over last year of \$4,291,654. Thirty-four roads appear in the list, the large systems being divided. The Louisville & Nashville comprises 18 divisions and branches.

The Standard Oil Co. at Duluth.

The Standard Oil Co. has let contracts for new buildings at Duluth. Two tanks will be built at Oncoota, three miles from Duluth, and it is said that the tank car business now done from St. Paul and Mankato will be transferred to Duluth.

New Passenger Station at Niagara Falls.

The handsome new passenger station of the New York Central, at Niagara Falls, N. Y., to take the place of the one burned last winter, is now substantially completed. It is described as an elegant building, supplied with accommodations equal, if not superior, to those of any other station on that road. The inside finish of the building is oak, much of it elaborately carved, and cathedral glass is freely used. Over the main entrance, which is through a 24-ft. arch, is a fine canopy. The vestibule is 8 x 28. The waiting rooms are 55 x 55 and 32 x 53, and are connected by two arches, each of 18-ft. span. Opening into the larger room are a ticket office, 14 x 30; news room, 15 x 26; station master's office, 12 x 15, and telegraph office, 15 x 26. In addition to the two waiting rooms are two smaller rooms, one for ladies and one for smoking, each furnished with toilet rooms. The smaller of the two large waiting rooms has a handsome fireplace surmounted by an elegant clock. The steam heating boilers are on the same level with the waiting rooms, and for this reason the radiators are placed upon shelves 7 ft. above the floor, to afford the necessary fall for the return of the condensed steam. The building has been constructed by Dickinson & Allen, of Syracuse, N. Y., at a cost of about \$20,000.

The International Rail Manufacturers' Combination.

A Berlin paper has learned from Bochum with reference to the proposed international rail manufacturers' combination that an agreement has been arrived at between the representatives of the principal steel works with reference to

the division of foreign and home contracts for rails, and that only a few small works still hold back.—*Financial Times.*

Tramps.

On Saturday afternoon last 22 tramps who were driven off a Boston & Albany local freight train at Indian Orchard, Mass., resisted the trainmen and station officer, threatening to kill some of them, and made desperate attempts to get upon the train again when it started away. They were repulsed, however, and the train went on. They then terrorized the station agent for some time, the station being in a lonely place and assistance unobtainable. The agent telegraphed for assistance, while he barricaded the doors and windows. The superintendent responded with a special train and seven police officers from Springfield, but the tramps meanwhile left the station and started toward Springfield. On meeting the train they suspected its object and ran. Six of them were captured, however, and a seventh was killed by the accidental discharge of a policeman's pistol. Seven more were arrested at Palmer the next day. The station agent at Indian Orchard tells a reporter that 50 or 60 tramps a day pass his station.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Catawissa, 3½ per cent. on the preferred stocks, payable on demand.

Delaware & Bound Brook, 2 per cent., quarterly, payable Nov. 15.

Richmond & Petersburg, semi annual, 3½ per cent., payable Jan. 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Arkansas & Gulf, special meeting, Arkansas City, Ark., Dec. 1.

Denison & Washita Valley, special meeting, Denison, Tex., Dec. 1.

East Tennessee, Virginia & Georgia, special meeting, Knoxville, Tenn., Dec. 22, to consider the approval of the lease to the Richmond & Danville.

Fort Worth & Denver City, annual meeting, Fort Worth, Tex., Dec. 11.

Georgia Pacific, annual meeting, Birmingham, Ala., Nov. 28.

Lehigh & Hudson, annual meeting, 161 Broadway, New York City, Dec. 3.

New York, Lake Erie & Western, annual meeting, 21 Cortlandt street, New York, Nov. 27.

New York & New England, annual meeting, Boston Mass., Dec. 11.

Old Colony, annual meeting, United States Hotel, Boston, Mass., Nov. 27.

Pittsburgh & Connellsville, annual meeting, Pittsburgh Pa., Dec. 3.

Richmond & Danville, annual meeting, Richmond, Va., Dec. 5.

Richmond & West Point Terminal Railway & Warehouse Co., annual meeting, Richmond, Va., Dec. 11.

St. Louis Southern, annual meeting, Pinckneyville, Ill., Nov. 21.

Suspension Bridge & Erie Junction, annual meeting, 21 Cortlandt street, New York, Nov. 27.

Suspension Bridge & Erie Junction, annual meeting, 21 Cortlandt street, New York, Nov. 27.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Association of Railway Chemists will hold its next meeting in Baltimore, Md., Jan. 14, 15 and 16.

The New England Railroad Club meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The Western Railway Club meets the third Tuesday in each month in the Phenix Building, Chicago.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

The Western Society of Engineers holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The Engineers' Club of St. Louis holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at Pittsburgh, Pa.

The Engineers' Club of Kansas City meets at Kansas City, Mo., on the first Monday in each month.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m. on the third Saturday in each month.

Engineers' Club of St. Louis.

The following is the programme of this club for the sessions of 1888-1889:

Nov. 7.—Supper in honor of Twentieth Anniversary.

Nov. 21.—Smoke Prevention, Robert Moore, Civil Engineer.

Dec. 5.—Annual Meeting. Reports of officers and committees; Condensers for Steam Engines, Prof. J. H. Kinealy, A. and M. College of Texas.

Dec. 19.—Address of retiring President, M. L. Holman, Water Commissioner, City of St. Louis; Changing the Gauge of the Ohio & Mississippi Railway, Isaac A. Smith, Manager St. Louis Transfer Railway.

Jan. 2, 1889.—The Interlocking System of the St. Louis Bridge and Tunnel Railroad, N. W. Eayrs, Civil Engineer St. Louis Bridge Co.; A New Power Drill for Quarries and Mines, with Notes on Mining in Colorado, J. A. Ockerson, Manager Silver Age Mining and Milling Co.

Jan. 16.—Wrought Iron and Steel Eyebars, Carl Gayler, Bridge Engineer, City; A Burr Truss, Prof. A. E. Phillips, Purdue University.

Feb. 6.—Rainfall and River Discharge in the Mississippi Valley, Prof. F. E. Nipher, Washington University; Adding Machines, N. W. Perkins, Jr., Mechanical Engineer.

Feb. 20.—Elevated Railroads, Geo. H. Pegram, Consult-

ing Engineer; Tests of, and Specifications for, Cast Iron, Prof. J. B. Johnson, Washington University.

March 6.—Shortage on Coal in Car Lots, Thos. D. Miller, Manager Fort Worth (Tex.) Gas Co.; Improving the Channel of the Mississippi, Winslow Alderdice, Consulting Engineer.

March 20.—Street Car Running Gear, B. F. Crow, Superintendent Brownell & Wight Car Company; Some Reminiscences in Connection with the Construction of the Union Pacific Railroad, C. H. Sharman, Superintendent Illinois & St. Louis Railroad.

April 3.—The Boiler for Use at Coal Mines, Lewis Stockett, Chief Engineer Consolidated Coal Co.; Steam Plants for Electrical Service, Wm. H. Bryan, Mechanical Engineer.

April 17.—The Sanitary Condition of the Water Supply of New York City, Prof. Chas. C. Brown, Union College, Engineer New York State Board of Health; Easement Curves, Missouri Pacific Railway, Willard Beaban, Engineering Department Missouri Pacific Railway.

May 1.—Some New Theories and Experiments on Boiler and Factory Chimneys, Prof. H. B. Gale, Washington University; Experiments on Settling Water, Jas. A. Seddon, St. Louis Water Works Extension.

May 15.—The Trussing of the Fagin Building against Wind Pressure, Prof. J. B. Johnson; Fire-Proof Flooring, P. M. Bruner, Contractor.

June 5.—The Olive Street Cable Line, W. Bartlett, Engineer; Compound Engines, E. E. Furney, Missouri River Commission.

PERSONAL.

—Roswell Miller, President and General Manager of the Chicago, Milwaukee & St. Paul, sailed for Europe this week.

—W. H. Chauncey has tendered his resignation as Assistant Superintendent of the Western division of the Rome, Watertown & Ogdensburg.

—Col. Thomas T. A. Lyon, formerly President of the Mobile & Northwestern, died suddenly at Mobile, Ala., Nov. 16. Apoplexy was the cause of Col. Lyon's death.

—T. L. Chapman, lately Superintendent of Motive Power on the Chesapeake & Ohio, has accepted the position of Assistant General Manager of the Safety Car Heating & Lighting Co., of New York City.

—Mr. J. A. Anderson, Superintendent of the Pennsylvania Railroad Voluntary Relief Department, sailed for Europe on Wednesday of this week. Mr. Anderson goes abroad for the benefit of his health, which has been poor for some time.

—Mr. W. F. Doolittle has been appointed Assistant Superintendent of the Railway Mail Service, with headquarters at New York, vice R. C. Jackson, resigned. This office controls all the railroad mail service from the New York post office.

—Lorenzo Blackstone, who was for 25 years a director of the Chicago & Alton, and one of the large stockholders, died at an advanced age, at Norwich, Conn., Nov. 14. He was a brother of T. B. Blackstone, President of the Chicago & Alton.

—The friends of the late Henry Monett, General Passenger Agent of the New York Central & Hudson River, propose to erect a monument to his memory, and have selected W. A. Thrall, E. J. Weeks and C. P. Craig a committee to solicit subscriptions from railroad men, no subscription to exceed \$2.

—The vacancy in the board of directors of the Southern Pacific Company, caused by the death of Charles Crocker, has been filled by the promotion of Third Vice-President C. T. Crocker to be Second Vice-President, and the election of A. N. Towne as a director with the position of Third Vice-President. In addition to his new duties Mr. Towne will still retain his position of General Manager of the system.

—Prof. Emil Winkler, a famous engineer, who was a professor at the Technical High School in Berlin, Germany, and whose works on bridge construction are known over the world, died on Aug. 27. It is intended to erect a statue to his memory, and the *Centralblatt der Bauverwaltung* expresses, in its issue of Oct. 3, the desire that his pupils and friends and members of the profession may contribute to erect a statue worthy of the man. As a number of his pupils live in the United States, they may be glad to be informed on this subject. Contributions will be received by the Geschäftsstelle des Centralblattes der Bauverwaltung, Berlin, Germany.

—Col. John McLeod has been appointed General Manager of the Louisville Southern, in addition to his duties as Chief Engineer. Col. McLeod is 58 years old and has been in the railroad service since 1853. He was for several years in the engineer corps of Kentucky railroads. From October, 1855, to April, 1859, he was Principal Assistant Engineer of the Louisville, Cincinnati & Lexington, and was then for three years Chief Assistant Engineer of the Elizabethtown & Paducah, and in the early part of 1872 was made Chief Engineer and Superintendent of the same road. From July, 1874, till August, 1876, he was General Superintendent of the Louisville, Cincinnati & Lexington; from August 4, 1876, to July 15, 1878, he was its Receiver, and from the latter date until 1880 he was the General Superintendent. From January, 1880, till 1884, he was General Superintendent of the Louisville, New Albany & Chicago, and since 1886 he has been Chief Engineer of the Louisville Southern.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—A circular has been issued announcing the removal of the headquarters of the Southern Division of the system from Mulvane to Wellington, Kan. The division was created a year ago out of lines formerly attached to the Middle Division, and comprise about 1,000 miles of road. It embraces the new Gulf and Panhandle divisions of the Southern Kansas, the Mulvane extension of the Chicago, Kansas & Western, and all lines of the road south of Newton and west of El Dorado.

Baltimore & Ohio.—The stockholders of the company held their annual meeting in Baltimore, Nov. 19, and the following directors were elected: Charles F. Mayer, James Sloan, Jr., William F. Burns, Decatur H. Miller, William H. Blackford, Aubrey Pearre, George DeB. Keim, Wesley A. Tucker, Maurice Gregg, J. Wilcox Brown, William G. Atkinson, William F. Frick. The last seven directors succeed William Keyser, James L. McLane, John Gregg, George W. Dobbin, James Carey Coale, G. A. von Linggen and Robert Garrett. Of the seven new directors, William F. Frick represents the Garrett interest and succeeds Robert Garrett, and George DeB. Keim was elected in the Philadelphia & Reading interest. Of the 66,106 shares that were voted proxies for 64,136 shares were held by William F. Frick, who thus represented all large interests, except the 15,000 shares held by the Johns Hopkins estate, which is practically without a representative on the newly elected board.

Boston & Providence.—The annual meeting of the stockholders was held in Boston, Nov. 21, and the following directors were elected: Henry A. Whitney, Thomas P. I. Goddard, Wm. R. Robeson, J. W. Balch, Royal C. Taft, R. H. Stevenson, Roger Wolcott.

But one Auditor being needed, J. Wilson Smith was retired with a vote of thanks, and James O. Johnson was appointed to prove the bonds of the corporation for the ensuing year. The date of the annual meeting was changed from the third Wednesday in November to the second Tuesday in October, to suit the system of accounting recommended by the Railroad Commissioners.

Buffalo, Rochester & Pittsburgh.—At the annual meeting of the company in New York, Nov. 19, the only change in the board of directors was the substitution of Henry Fatio for Frederick A. Brown. The full board is composed of the following members: Waiston H. Brown, Adrian Iselin, Adrian Iselin, Jr.; Frederick D. Tappan, J. Kennedy Tod, Wheeler H. Peckham, Auguste Richard, John G. Neiser, Henry I. Barbey, John H. Hocart, Alfred Roosevelt, A. H. Stevens and Henry Fatio. Adrian Iselin, Jr., was elected President.

Charleston, Cincinnati & Chicago.—At a meeting of the stockholders of the road, in Charleston, S. C., last week, Frank Cox, of Philadelphia, was elected President. Among the directors are Chester W. Chapin, of New York; Wharton Barker, of Philadelphia; James A. Rumrill, of Springfield, and W. F. Weed, of Boston.

Cincinnati, Indianapolis, St. Louis & Chicago.—At a meeting of the board of directors in Cincinnati this week the old officers of the road were re-elected.

Deadwood Central.—Thomas H. White, of Deadwood, Dak., has been appointed Superintendent of Construction.

East Tennessee, Virginia & Georgia.—Over \$28,000,000 of capital stock of the company was represented at the annual meeting of stockholders in Knoxville, Tenn., Nov. 21. A resolution indorsing the Richmond & Danville lease was adopted, only 70 shares of stock being voted against its passage. The directors for the ensuing year are: Samuel Thomas, Calvin S. Brice, George S. Scott, John H. Inman, John G. Moore, M. M. Logan, E. J. Sanford, W. S. Chisholm, John Greenough, W. L. Bale, Richard Irvin, Jr., George Coppell, Thomas P. Fowler, Charles M. McGhee and James E. Grannis. The meeting adjourned until Nov. 28, when a full report of the Richmond & Danville lease will be read.

Kansas & Arkansas Valley.—The following are named as directors in the charter just filed in Kansas: David Kelso, R. T. Holloway, W. H. Martin, of Parsons, and George C. Smith and E. G. Merriam, of St. Louis. E. G. Merriam was elected President, David Kelso Vice-President, George C. Smith Secretary and Treasurer, and W. H. Martin Assistant Secretary and Treasurer.

Kansas City & Blue Valley.—The following is the first Board of Directors of this Missouri company: Morrison Munford, Thomas J. Green, L. E. Davison, E. M. Holmes and A. D. Leech, all of Kansas City.

Kentucky Midland.—The directors chosen at the annual meeting, Nov. 14, are: William Lindsay, D. W. Lindsay, J. T. Buckley, E. L. Samuel, E. H. Taylor, Jr.; James E. Cantrell, Wm. N. Smoot, James W. Ferguson, James M. Thomas. The officers elected are: William Lindsay, President; D. W. Lindsay, Vice-President; E. L. Samuel, Treasurer; A. H. McCurl, Secretary, and the general offices are at Frankfort, Ky.

Lake Erie & Western.—At the annual meeting of the company last week Calvin S. Brice was elected President; Hebron Robinson, Vice-President, and L. M. Schwan, Secretary.

Lehigh Valley.—President E. P. Wilbur has issued the following circular:

On and after Dec. 1, 1888, the several rail and water lines owned, controlled or operated by the Lehigh Valley Railroad Co. will be operated as the Lehigh Valley Railroad system, under the following organization: Charles Hartshorn, Vice-President, Philadelphia, in charge of the finances of the several companies, and of general executive business in the absence of the President; Robt. H. Sayre, Second Vice-President, South Bethlehem, Pa., supervision of the engineering, construction and transportation departments. John B. Garrett, Third Vice-President, supervision of the traffic and accounting departments. Rollin H. Wilbur, Assistant to Second Vice-President, South Bethlehem, Pa., will have special charge of the assignment and distribution of the locomotive and car equipment of the system. H. Stanley Goodwin, General Eastern Superintendent, South Bethlehem, Pa., will have charge of the roadway and transportation departments of the main line, branches and leased lines south and east of Lackawanna & Bloomsburg junction, including the Mountain Cut-off, Pleasant Valley Branch and the Morris Canal. William Stevenson, General Northern Superintendent, Sayre, Pa., will have like charge of the main line, branches and leased lines north of Lackawanna & Bloomsburg Junction, including the West Pittston branch and the Wilkesbarre & Harvey's Lake Railroad. Capt. William P. Henry, General Manager of the Lehigh Valley Transportation Co., Buffalo, N. Y., will have charge of lake transportation. F. B. Morris, General Manager of the Perth Amboy Towing Line, Perth Amboy, N. J., will have charge of transportation of coal on New York Bay and adjacent waters. Isaac McQuilkin, Controller, Philadelphia, will have charge of the several accounting offices of the system.

Los Angeles, Utah & Atlantic.—The directors of this California company are J. M. C. Marble, of Van Wert, Ohio; S. O. Houghton, L. R. Winans, L. F. Scott, of Los Angeles, and C. W. Scott, of Monroe, Mich. The principal place of business will be in Los Angeles.

Louisville Southern.—Col. John MacLeod has been appointed General Manager, in addition to his duties as Chief Engineer. Heretofore the President has acted as General Manager.

Manitou & Pike's Peak.—John Hulbert, W. A. Bell, B. F. Crowell, Louis R. Ehrich and Albert E. Pattison are the incorporators of this new Colorado company.

Mann's Boudoir Car Co.—Major John C. Paul, General Manager of the Woodruff Sleeping & Parlor Coach Co., has also been appointed Assistant General Manager of this company, and will have charge of the operation of its cars and shops. Frank E. Miller has been appointed Commissary, and will have general charge of the buffet business of the company.

Mexican National Construction Co.—H. P. Webb, Auditor and Cashier, has also been appointed Accountant for the company, as regards its relations to the Mexican National Railroad, an office provided for by the terms of agreement under which the latter company was reorganized.

Missouri, Kansas & Texas.—Warner, Dean and Hagerman, of Kansas City, have been appointed General Solicitors, with office at Selalia, Mo.

Naugatuck.—At the annual meeting of the stockholders of the company, held in Bridgeport, Conn., Nov. 21, the following board of directors was elected: W. D. Bishop, of Bridgeport; Joel A. Sperry, J. B. Robertson, of New Haven; S. S. Dennis, of New York; A. L. Dennis, of Newark, N. J.; A. B. Shattuck, of Derby, Conn.; W. D. Bishop, Jr., of Bridgeport; F. J. Kingsbury, of Waterbury, and D. W. Plumb, of Shelton. At a subsequent meeting of the directors, W. D. Bishop was elected President and Horace Nichols Secretary.

New Haven & Derby.—At the annual meeting in New Haven, Conn., this week the following directors were elected: J. A. Bostwick, W. A. Starbuck, J. L. Macaulay, Henry Hentz, E. I. Carey, M. E. Stowe, all of New York; S. E. Merwin, William E. Dennis, N. D. Sperry, of New Haven; L. Farrell, E. N. Shelton and Thomas Wallace, of Ansonia, Conn.; W. H. Stevenson, of Bridgeport, Conn. The board of directors re-elected W. H. Stevenson President; Charles Atwater, Treasurer; A. H. Kellam, Secretary, and J. A. Bostwick, W. A. Starbuck and J. L. Macaulay Executive Committee.

New York, Lake Erie & Western.—Vice-President E. B. Thomas has issued a circular announcing that "the jurisdiction of Ross Kells as Assistant Superintendent of Motive Power, with office at Cleveland, Ohio, heretofore confined to the 'Nypano' is extended to cover all lines controlled by this company."

Washington Laundry, recently Master Mechanic of the 'Nypano' at Meadville, Pa., has succeeded V. Blackburn as Master Mechanic of the Susquehanna Division.

New York, Pennsylvania & Ohio.—The following promotions have been made: S. Higgins, Master Mechanic of the Eastern division, with headquarters at Meadville, Pa., vice W. Lauery, promoted to Master Mechanic of the Susquehanna division of the Erie proper. A. W. Ball is appointed Master Mechanic of the Mahoning division, with headquarters at Cleveland, O., vice T. Higgins, promoted. S. D. Whipple is appointed Road Foreman of Engines, vice A. W. Ball, promoted.

Northern Pacific.—J. W. Scott, recently of the Atlantic & Pacific, has been appointed Superintendent of the Idaho division to succeed F. P. Weymouth, with office at Sprague, W. T.

Petersburg.—At the annual meeting of the stockholders of this company, in Richmond, Va., last week, the old officers and directors were re-elected.

Philadelphia & Reading.—Everett R. Reynolds, Private Secretary to President Austin Corbin, has been elected Assistant Secretary, with office in New York.

Richmond, Fredericksburg & Potomac Railroad.—The annual meeting of the shareholders was held at the offices in Richmond, Va., Nov. 21. J. P. Brinton was re-elected President and J. B. Winston Secretary and Treasurer.

Richmond & Petersburg.—At the annual meeting of the stockholders of this company, in Richmond, Va., this week, the old officers and directors were re-elected.

Southern Pacific.—The vacancy in the board of directors caused by the death of Charles Crocker, has been filled by the promotion of Third Vice-President C. T. Crocker to be Second Vice-President, and the election of A. N. Towne to be a seat in the directorate, with the position of Third Vice-President. In addition to his new duties Mr. Towne will retain his position of General Manager.

Stockton, Fresno & Southern.—The directors of this California company are: Thomas R. Hayes, L. M. Hickman, of Stanislaus County; A. S. Murray, George H. Collins, A. B. Hunt, D. E. Hayes and H. L. Davis. H. L. Davis is President of the company, A. T. Eggleston Secretary and F. Homer the Chief Engineer.

Stuttgart & Arkansas River.—The directors of this new Arkansas company are: W. F. Darrell, of Little Rock; T. H. Leslie, A. D. Swan, T. C. Mallaly, of Stuttgart, and O. E. Overton, of Bernadotte, Ill.

Union Pacific.—J. B. Gilchrist has been appointed Assistant Superintendent of the Colorado Division, with office at Denver, Col., vice J. Rapelji, appointed Superintendent of the Idaho Division.

Utica & Unadilla.—The following are the officers of this new company: Albert C. Couch, President; Delos E. Culver, Treasurer; R. Floyd Clark, Secretary, all of New York City.

Virginia & Northwest.—The incorporators of this West Virginia company are: L. Kessler, St. Albans; H. M. Smith, E. C. Sterling and S. W. Hydall, of New York, and S. W. Hallowell.

Washington Branch (Baltimore & Ohio).—The annual meeting of the stockholders was held at Hagerstown, Md., last week, and the following directors were chosen: William M. Clements, William Burns, John H. Fowler, of Baltimore; Jacob H. Miller, John W. Stonebraker, Edward W. Mealy and W. S. Kennedy, of Washington County, Md.

Yankton, Norfolk & Southwestern.—The projectors of this new Nebraska company are James H. Teller, John T. M. Pierce, J. P. Clennan, William H. H. Beadle and Edwin H. Van Antwerp.

OLD AND NEW ROADS.

New Companies Organized.—Cincinnati, New Richmond & Ohio.—Mountain Granite & Marble Falls City.—Kansas & Arkansas Valley.—Kansas City & Blue Valley.—Manitou & Pike's Peak.—Stuttgart & Arkansas River.—Utica & Unadilla Valley.—Virginia & Northwest.—Yankton, Norfolk & Southwestern.

Adams Express Co.—The company is extending its service in the Northwest, and besides the Chicago, Milwaukee & St. Paul, will take possession on Dec. 1 of the business over the Toledo, Peoria & Western from the state line through to Burlington (Iowa) and Keokuk. The St. Paul & Duluth has made a contract for a term of years with the company, displacing the United States Co. With the lines of the St. Paul road this makes over 8,000 miles in the Northwest formerly occupied by the United States Co. and over which the Adams will now operate.

Alabama Midland.—The locating survey on the first 35 miles of the road has been finished and grading will soon be commenced. The contract has been let to J. M. Brown & Co., of New York, who will sub-let the work.

Birmingham Mineral.—At a meeting in Birmingham, Ala., last week the stockholders voted to increase the capital stock of the company \$3,000,000. It is understood that the purpose of the increase is to finish the Huntsville extension beyond Chepultapec and to make a number of

needed improvements to the track, and purchase additional rolling stock.

Cairo & Tennessee.—Hopkinsville, Ky., last week voted a subscription of \$200,000 to this proposed road from Cairo, Ill., to Chattanooga.

Chattanooga, Rome & Columbus.—The state legislatures will be asked to amend the charter so as to permit the building of the projected extensions to Montgomery, Ala.; Atlanta, Ga., and other points. The hearing of the Chattanooga Brick Co. for the appointment of a receiver has been postponed to Dec. 10.

Chiapas.—It is stated that the surveys for the final location of this road will be made next January. The greater part of the line can be built cheaply, and there will be no tunneling. The company has a subsidy for a line from Tonala, in the state of Chiapas, to Mal Paso, or any other point on the River Chiapa or Grijalva, from which the river is navigable to the Gulf of Mexico.

Chicago, Burlington & Quincy.—The daily papers are discussing a report that preparations are being made to extend the road 300 miles westward to Wyoming during the next year.

Chicago, Kansas & Nebraska.—On Nov. 18 the company opened the extension to Colorado Springs, Col., for passenger traffic. The road has been opened for freight traffic for nearly a month. Trains will be run through between Chicago and Denver and Pueblo, to the last two places over the Denver & Rio Grande tracks.

Chicago & Northwestern.—It is reported that surveyors are running a line from Freeport to Galena, Ill., for a proposed road of this company between these points. The Illinois Central has a line between the two cities, and they are also on different branches of this road.

Cincinnati & Birmingham.—A proposition has been made to build the road if the citizens along the proposed line will subscribe stock to the amount of one-tenth the cost of its construction. The estimated cost of the entire road is \$10,000,000, and the people along the line from the Alabama and Tennessee state line to the Cincinnati Southern road at or near Somerset, Ky., are asked to take \$1,000,000 stock in the road. The line, as run in the preliminary survey already made, traverses the counties of Lincoln, Moore, Coffee, Cannon, De Kalb, Putnam, Overton and Pickett in Tennessee, and the county of Wayne in Kentucky.

Cincinnati, Hamilton & Dayton.—The citizens of North Baltimore, Wood County, Ohio, have submitted a proposition to the company to extend the Bowling Green division of the Dayton & Michigan to that town. North Baltimore is in the great gas and oil belt of northwestern Ohio. The proposed line would be about 14 miles long, and in the gas and oil district almost its entire length.

Cincinnati, New Richmond & Ohio.—Incorporated in Ohio to build a branch line of the Cincinnati, Georgetown & Portsmouth in Clermont County. The proposition to build the branch was approved at the last annual meeting of the stockholders of the latter company.

Cleveland & Canton.—The entire road is now standard-gauge from Cleveland to Coshocton, O., 115 miles, and also on the branch from Canton to Sherrodsville, 42 miles. The change from narrow gauge to standard was completed Nov. 18. The road is now constructing three branches and extensions to Wheeling, W. Va., to Zanesville and to Chagrin Falls, which will considerably increase its mileage and importance. These lines are as follows: The Coshocton Southern, from Coshocton to Zanesville, now in course of construction, is expected to be in operation Feb. 1, 1889. The Cleveland, Chagrin Falls & Northern, from Chagrin Falls Junction (South Solon) to Fairport, now in course of construction, is expected to be in operation as far as Chagrin Falls by Feb. 1, 1889. The South Pennsylvania & Ohio, from Canton to Martin's Ferry, Wheeling and Bellaire, is now in course of construction and expected to be in operation by Jan. 1, 1890.

Colorado Midland.—It is stated that work will soon be commenced by a separate company on a cut-off, 12 miles long, to extend from Crystal Lake Station 12 miles out and then to the main line again, saving the circuitous climb to Leadville. This cut-off is to be used only for through freight from Denver and eastern points to Aspen and western points. It will save five miles and a 4 per cent. circuitous grade to Leadville. The passenger trains will run through Leadville as now. The line, when completed, will be leased to this company.

Denver & Rio Grande.—The company has put a force of tracklayers at work at Canon City, Col., laying the third rail from that city westward through the Royal Gorge to Leadville. It is the intention to prosecute the work vigorously until the third rail connects Denver, Canon City and the great Carbonate Camp.

Dexter & Piscataquis.—Contracts for building this Maine road from Dexter to Dover, Me., a distance of 18 miles, will be let immediately by J. B. Peaks, of Dover.

East Tennessee, Virginia & Georgia.—A circular has been issued to the second preferred and common stockholders asking co-operation to defeat the lease to the Richmond & Danville, and the following reasons are given: First, the making of such a lease is an abuse of power on the part of the present board. Second, the lease is entirely in the interest of the first preferred and the Richmond & Danville. Third, because under no circumstances can the second preferred stock and common stock ever derive any income from the lease. Fourth, because the lease fails to provide for the return of roads built and properly acquired by the proceeds of securities to be issued by the East Tennessee upon the termination or forfeiture of the lease. Fifth, because no provision is made for maintaining the marks and designations upon the rolling stock and locomotives of the lessor. The circular further says: Apart from these objections, it is also in violation of the injunction of the court in the case of the Memphis & Charleston and of the laws of Alabama, and in violation of the statutes of Tennessee, while it exposes all of the property of the company in Georgia to forfeiture in consequence of the violation of the constitution and laws of that state and of the charter of the company. If approved at the meeting of stockholders, proceedings to forfeit the property in Georgia are inevitable—the charter declaring that if the owners of a competing line shall become the owner of a controlling interest in the railroad thereby chartered, the charter shall be ipso facto null and void and it shall be the duty of the Attorney General "instantly" to commence proceedings to forfeit the same. Several of the directors representing the second preferred and common stockholders have issued a circular addressed to these stockholders in answer to the one quoted above. The circular says that each of the principal allegations in the previous circular contains errors either of fact or of inference, and gives the ten considerations influencing the action of the directors in preparing the lease to the Richmond & Danville. It is claimed that the lease makes a vast relative improvement in the position of the juniors as compared with that which they occupied before. A bill has already been filed in

the court of chancery of the state of Tennessee by stockholders, to restrain the execution of the lease, and in particular to enjoin the Richmond & West Point Terminal from voting upon its \$6,500,000 of first preferred stock, and also to restrain all other holders of the first preferred stock from voting upon the lease, and for the appointment of a receiver to manage the property until a board can be elected representing exclusively the interests of the East Tennessee. Samuel N. Dickson and others, of Philadelphia, representing minority stockholders of the road, last week filed a supplemental bill in the Chancery Court of Knox County, Tenn. They pray that the meeting of stockholders called for Dec. 22, for the purpose of ratifying the Richmond & Danville lease, be postponed until the minority stockholders have an opportunity of registering their shares, and that a receiver be appointed at once.

Chancellor Gibson rendered a decision at Knoxville, Tenn., last week on the second bill filed by the minority stockholders of the company against the directors of the company and the Richmond & West Point Terminal Co. The complaint was made that the holders of the first preferred stock had no right to elect a board of directors without the participation of the holders of the second preferred and common stock and an injunction was prayed for stopping the election of directors advertised to be held this week. The Court held that the plaintiffs had been in possession certificates of stock for two years, bearing on their face the conditions and amendments under which they were issued, and that the complaint was not justified either in law or equity. A decision on the first bill will be made this week.

Fort Worth & Rio Grande.—Specifications for the extension from Granbury to Brownwood, 110 miles, have been submitted to contractors, and the contract will be awarded this or next week. It is thought that work will be begun early next year.

Freehold & New York.—The company has commenced work on its extension to Atlantic Highlands, N. J. The new branch will pass through Port Monmouth and Keansburg, going by way of Keyport. This will open up a portion of Monmouth County hitherto inaccessible by rail.

Granite Mountain & Marble Falls City.—Charter filed in Texas to build a four mile branch of the Austin & Northwestern, from Granite Mountain to Marble Falls.

Gulf & Ship Island.—It is stated that a survey will soon be made for a proposed line to Jackson, Tenn., from Middleton, Tenn.

Henderson State Line.—A project is on foot to merge this company and the Bowling Green, Hartford & Ohio River into one, and to build a road as to be satisfactory to the people along the line of each of the proposed roads. A meeting for the purpose of consolidation will be held at Calhoun, Ky., Dec. 10.

Hereford.—The laborers on this Canadian road, who were defrauded of several months wages by the absconding contractors, have again caused trouble. This week they captured some of the rolling stock and burned a bridge. The rolling stock was soon regained, though not until the laborers had been fired upon. Many of the strikers have now left the country.

Kansas & Arkansas Valley.—The company has filed a charter with the Secretary of State of Kansas for the proposed extension from Wagoner, I. T., and thence from a point on the southwestern boundary of Montgomery County, and thence in a northeasterly direction through the county of Montgomery to a point near Coffeyville, Kan.

Kansas City & Blue Valley.—The company has been chartered in Missouri to build a standard gauge road five miles long from the intersection of Blue avenue and Kensington street, in Kansas City, to the western limits of the city of Independence.

Kansas City & Southern.—The road will be formally opened for traffic on Dec. 1. Tracklaying was completed early this summer, and the road has been carrying freight for some months. The road extends from Kansas City to Osceola, Mo., 114 miles, and opens up valuable coal fields. The road runs nearly parallel with the Fort Scott road, but is fourteen miles shorter between Kansas City and Fort Scott. It meets the Fort Scott road at Belton and the Missouri Pacific at Dodson and other points, and both these roads at Harrisonville. Its terminus in Kansas City is the Chicago, Milwaukee & St. Paul station, and it enters the city over the Belt line. Surveys have already been made for an extension towards Memphis, and it is expected that work on this extension will commence next spring.

Kansas City, Wyandotte & Northwestern.—The contract for building a line from De Witt, Neb., south to the state line, is reported let to M. Sisk, and it is stated that work will soon commence.

Kentucky Midland.—The annual meeting of the stockholders was held last week at Frankfort, Ky. A construction company was authorized to be formed at once to complete the road from its present terminus to the coal fields of Eastern Kentucky, a distance of about 100 miles. The company has also in contemplation the extension of the road from Frankfort to Lexington, Ky., a distance of 16 miles.

Knoxville, Cumberland Gap & Louisville.—Tracklaying on this road was commenced this week, and 6,000 tons of rails have already been purchased. Thirty-five miles of the road have now been graded from Knoxville, Tenn. George R. Eager, of Knoxville, is General Manager of this road and also of the Knoxville Southern.

Los Angeles, Utah & Atlantic.—The capital stock of this company, the incorporation of which was mentioned last week, is placed at \$10,000,000, to construct a road from the Bay of San Pedro, through the city of Los Angeles, thence northerly through the counties of San Bernardino, Kern and Inyo by the most practical route to the eastern line of the state of California, with a branch from its main line to the southerly end of the peninsula at Los Alamitos Bay, the estimated length being 275 miles.

Louisville, St. Louis & Texas.—The road will probably be opened for business between Louisville and Owensboro, Ky., by Dec. 1. The severe rains that have prevailed recently have retarded work at various places along the line, but it is now so far advanced that the company expect to have trains running about the date mentioned. The road will be completed to Henderson some time later. The track is already laid between Owensboro and Henderson, but the company has been delayed in completing the bridge across Green River.

Manitou & Pike's Peak.—Incorporated in Colorado to build a road to the summit of Pike's Peak, from a point near Colorado Springs or Manitou. It is proposed to construct a rack road similar to the one up Mount Washington. Two companies under the name of the Pike's Peak Railroad & Improvement Co. have previously been incorporated to build a road over this route, and the latter company spent a considerable amount of money in grading before the project was abandoned.

Mexican Central.—Work on the road between Tampico and San Luis Potosi is being pushed day and night. The company is laying steel rails along the whole line.

Missouri, Kansas & Texas.—The receivers will proceed without delay to construct at least ten miles of the Dallas & Waco branch, which will insure the charter against forfeiture. The Receivers have made a proposition to build the branch through to Waco, Tex., if \$10,000 and the right of way is donated. The line has been located from Dallas to Hillsboro with the intention of using the Missouri Pacific track from Hillsboro to Waco, but the Receivers contemplate the construction of a line from Dallas to Waco, passing through Waxahachie and Milford, running 12 miles east of Hillsboro.

Newburg, Dutchess & Connecticut.—A basis has been agreed upon and negotiations are in progress for a consolidation of the Newburg, Dutchess & Connecticut with the New York & Massachusetts. The plan is to extend the lines of the consolidated company from a point near Ancram, N. Y., by way of Great Barrington and Westfield, to Chicopee, Mass., where connection will be made with the Boston & Maine system.

New Haven & Derby.—The Connecticut Railroad Commissioners have accepted the extension of the road and through trains from New Haven to Botsford will be run, commencing Nov. 20.

New Orleans, Natchez & Fort Scott.—The locating survey has been resumed at Natchez, Miss., and it is stated that construction will commence at Vidalia, La., in two months.

New Roads.—A new road is said to be contemplated from Coal Glen, in Jefferson County, Pa., to Lane's Mills, to connect with the Pennsylvania. If built, it will secure a portion of the traffic in coal from the Jefferson mines, which at present goes wholly by the Buffalo, Rochester & Pittsburgh road.

It is stated that W. M. Roberts, of Cobleskill, N. Y., will soon make a survey between Gassetts, Vt., and Claremont Junction, N. H., for a road between these two points, connecting the Boston & Maine system with that of the Central Vermont.

New York, Mahoning & Western.—This road is again becoming prominent, this time from a newspaper report that Theodore Frothingham, of Philadelphia, and William Thorpe, of New York, are seeking to purchase it for the "American Midland Railway Co., a corporation which has for the last 15 years been endeavoring to obtain a short route between Pittsburgh and Chicago across Ohio."

New York, Ontario & Western.—The company is relaying the track of the New Berlin branch with steel rails. The work of grading and bridging the eight-mile extension from New Berlin to Edmeston, N. Y., is practically completed and tracklaying has begun. Trains will be running to and from Edmeston by Jan. 1 next.

North Attleboro & Wrentham.—The petition of the company for a certificate that public convenience and necessity require the construction of a railroad commencing at or near the station of the New York & New England in North Attleboro, known as Adamsdale, and extending through the towns of North Attleboro, Wrentham, Norfolk and Walpole, to a terminus in Walpole, has been refused by the Railroad Commissioners, and a certificate granted to the Old Colony for a line over a similar route.

Northern California.—The company has filed with the California Railroad Commission a map of the new line between Grafton, on the Sacramento River, and Marysville. Work on this road has been going rapidly forward, and now construction forces are within eight miles of Grafton. It is hoped to have trains running into Grafton by Dec. 1. The line is about 30 miles in length, crossing Sutter county. The line crossing the Feather River enters Yuba city, and thence southeasterly.

Northwest & Florida.—The extension from Live Oak south to Laverne, Fla., has been completed and opened for traffic.

Ohio Valley.—Hopkinsville, Ky., last week voted this road a subsidy of \$200,000 to secure an extension from Henderson to that place, and surveyors are already in the field.

Old Colony.—The Railroad Commissioners of Massachusetts have granted the petition of the company for a certificate that public convenience and necessity require the construction of a branch or extension of its road from the town of Walpole, through the towns of Walpole, Norfolk, Wrentham and North Attleboro, to some point on the line of the Attleboro Branch road.

Oregon & Transcontinental Company.—At a recent meeting of the directors the subject of refunding the debt was referred to a committee, to report a plan within a week. The committee has decided that it will not liquidate the debt by the sale of the treasury assets. The alternative is a collateral loan, perhaps a renewal of the \$3,500,000 notes maturing Jan. 1 and the carrying of the balance in various time notes, as at present. The total debt is about \$5,800,000. A director is quoted saying that the company has an annual income of about \$780,000, and of this about \$440,000 is applicable to the reduction of the floating debt.

Owensboro, Falls of Rough & Green River.—The changes in the survey of the road are being made as rapidly as the circumstances will permit, and will be finished in a few days. At the end of that time the work will be ready for letting to the sub-contractors, and work may begin on the line by Dec. 10. It is reported that the bonds of the road have been placed in New York. J. W. M. Field, of Owensboro, Ky., has the contract.

Penobscot & Aroostook.—This company, recently organized, proposes to build a short road from Enfield, on the Maine Central, to a connection with the Canadian Pacific. The survey will soon be made. W. T. Pearson, of Bangor, Me., is one of the projectors.

Philadelphia & Reading.—The East Pennsylvania between Reading and Allentown, Pa., a distance of 26 miles, is to be made double track its entire length, the work being now in progress.

Pittsburgh, Akron & Western.—The survey for this road from Delphos to Akron, O., has been finished, and it is reported that grading will be commenced immediately. The new line would connect at Akron for Pittsburgh and at Delphos for Chicago, thus forming what is claimed will be a shorter route between these cities than any now in operation. It is an extension of the Cleveland & Western now in operation between Carey and Delphos, O., 56 miles, as a narrow gauge, which, however, will be changed to standard.

Pittsburgh, Cadiz & Zanesville.—The directors of this recently organized company have authorized an issue of \$2,000,000 of bonds, and the letting of a contract

for construction. The road is projected to connect Pittsburgh, McConnellsville and other coal districts in Pennsylvania with the Mahoning Valley in Ohio. It will be the fifth line in the "Black Diamond" system, and at Museville it is to connect with the Zanesville, Bradford & Pittsburgh road. In 1853 the route was surveyed from Maysville, Ky., to Pittsburgh, and some \$500,000 spent on grading from McConnellsville to Freeport.

Port Huron & Northwestern.—The main line of the road between East Saginaw and Port Huron, Mich., will be converted into a standard gauge and the terminals will be changed at East Saginaw to bring the road into the new station grounds of the Toledo, Saginaw & Mackinaw road. The ties are in place and the change can be made with but little delay.

Port Jervis, Monticello & New York.—It is expected to have the 18-mile extension from Huguenot to Summitville, N. Y., on the New York, Ontario & Western, completed in December. The road is all graded and tracklaying is in progress from both ends of the line. Work has been greatly impeded by the almost constant rains of September and October, rendering it impossible to make much headway on the long level track between Westbrookville and Wurtsboro.

Red Deer Valley Railway & Coal Co.—The company has given notice of application to the Canadian Parliament to incorporate the company to build a road from a point on the Canadian Pacific at or near Cheadle station, Alberta, to the coal fields of the Red Deer Valley, with a branch to Calgary.

Richmond & Danville.—It is announced that the company will establish a bureau in Georgia for the extension of its line and the encouragement of manufacturing plants along the lines now in operation.

Richmond & Petersburg.—At the annual meeting held in Richmond, Va., Nov. 19, a resolution was adopted authorizing the construction of a belt line around Richmond, from a point on the Richmond, Fredericksburg & Potomac west of the city, passing north of the reservoir and crossing the James River to a point on the Richmond & Petersburg on the southern side of the river. This is necessitated by the proposed removal of the present connection track through the streets of the city.

Richmond & West Point Terminal.—The company deposited with the Central Trust Co. last week \$3,950,000, being the last payment to complete the purchase of the Georgia Co. The capital stock of the Georgia Co. is \$12,000,000, all of which was bought at 35 cents on the dollar, making the purchase price \$4,200,000, of which \$250,000 was paid when the papers were signed. The properties controlled by the Georgia Co. (the Central Railroad & Banking Co. of Georgia, and the Ocean Steamship Co.) pass by purchase under the control of this company.

Rome & Decatur.—Under an order issued by Hon. John W. Maddox, Judge of the Rome, Ga., Circuit, and confirmed by the Chancery Court of Alabama, the Rome & Decatur Railroad has been placed in the custody of R. T. Dorsey, Receiver, to complete, equip and operate, and R. A. Bacon has been appointed Superintendent.

St. Louis, Sturgis & Battle Creek.—Tracklaying has been commenced at Battle Creek, Mich., and it is expected will be completed to Goshen, Ind., a distance of 65 miles, by Jan. 1. The road from Bay City, Mich., south to Battle Creek is called the Battle Creek & Bay City; from Battle Creek to the Indiana state line the St. Louis, Sturgis & Battle Creek, and from the Indiana state line, through Indiana toward Danville, Ill., it is called the Canada & St. Louis, but the three lines will be consolidated under the last name.

San Antonio & Aransas Pass.—Tracklaying is in progress between the Brazos River and Houston, Tex., on the extension from Wallace to the latter city. About five miles of track is already down.

San Francisco & North Pacific.—Tracklaying is going on rapidly on the extension from Cloverdale to Ukiah, Cal. The company's forces are doing the work. John Kelso, of San Francisco, had charge of all the grading work on the route. It is expected that work on the further extension of the line to Eureka will soon be commenced.

Savannah & Dublin.—Judge Emory Speer, in the United States Circuit Court for the Southern District of Georgia, has decided that the purchase in the interest of the Central Railroad of Georgia of the franchises of this company is void, because contrary to a provision of the Constitution of Georgia, prohibiting any corporation from purchasing the stock of any other, or making any contract which would have the effect of defeating competition or creating a monopoly.

Savannah, Griffin & North Alabama.—H. D. McDaniel has been appointed Receiver of the company by Judge Marshall J. Clark, of the Alabama Superior Court. The road has been put in the hands of a Receiver until the rights of the Central Railroad & Banking Co., which holds a mortgage on the road, are finally established.

Silverton.—The track on this road is now laid to within three miles of Ironton, Col., where it has been delayed by snow. No construction work has yet been done beyond Ironton.

Staten Island Rapid Transit.—It is stated that the road will be extended from the bridge to Roselle under a New Jersey corporation, where connection will be made with the Central of New Jersey. The approaches to the bridge at Staten Island have just been completed, over three-quarters of a mile of piling and trestle work having been found necessary. The work on the New Jersey side will also be expensive, and overhead crossings will have to be made over the Long Branch division of the Central of New Jersey, and also over the tracks of the Pennsylvania. It is expected that work will be commenced on the New Jersey side within about a month.

Stockton, Fresno & Southern.—It is understood that enough bonds have been placed to provide money to complete the road from Stockton to Visalia, Cal., and that construction will be commenced in a few months. The line projected is in the San Joaquin Valley, and is planned to extend from Stockton southeast to Visalia on the east side of San Joaquin River, passing midway between Oakdale and Modesto and below Fresno, running between the Southern Pacific main line and the new Foothill branch. The Stanislaus and Tuolumne rivers are to be bridged. Whether the line will run into Merced or not has yet to be decided. The survey runs six miles to the east and continues southward to Fresno and thence to Visalia. In the San Joaquin Valley at Merced the line maintains a distance of 9 to 12 miles from the main line of the Southern Pacific system. From Fresno south it runs between the main line and the new foothill line, but nearer the latter than the former.

Stuttgart & Arkansas River.—Articles of incorporation were filed with the Secretary of State of Arkansas this

week. The capital stock is \$500,000. The road will run from a point near Stuttgart to Arkansas Post, a distance of about 45 miles.

Tiffin & Fremont.—This company, which proposes to build a road from near Sandusky through Fremont to Tiffin, on the Baltimore & Ohio, 60 miles, has asked an aggregate of \$105,000 and right of way from Upper Sandusky, Tiffin and Fremont. J. Sloan is one of the promoters of the project.

Toledo & Ohio Central.—David H. Gould, as the holder of stock of the River Division of the Ohio Central Railroad, now reorganized under the above title, has brought suit in the Supreme Court of New York against George I. Seney, Samuel Shethar, the Metropolitan National Bank of New York, and the Ohio Central Co. for an accounting and the appointing of a receiver. The litigation grows out of the consolidation and completion of the roads forming the Ohio Central system, and involves a sum estimated by the plaintiff at more than \$2,000,000. The plaintiff offered in evidence a mortgage issued to the Central Trust Co. on the River Division of the Ohio Central for \$7,000,000 and the collateral security for the same amount given by the Ohio Central Coal Co. This loan is claimed to have been negotiated ostensibly for the protection of the subscribers to the Construction Company, who were the holders of the bonds of the consolidated roads that were to construct the River Division of the Ohio Central. J. M. Schwan, formerly Secretary of the Ohio Central, who was called as a witness, produced the minute book of the directors' meetings. He read a motion made by Calvin S. Brice, at the meeting of June 13, 1883, suggesting that the company borrow \$500,000 of the Metropolitan Bank, and give a note for the amount, and pledging as collateral security \$2,000,000 of Richmond & Allegheny Railroad bonds, received by the Syndicate Committee, to the Richmond & Allegheny road. This was done. On the third day of the argument C. S. Brice testified that the proposition was discussed to raise \$5,000,000, on the condition that the Richmond & Allegheny should have \$1,250,000 and the Ohio Central \$500,000. The Judge thought the case should be sent to a referee for an accounting on behalf of the defendants to the plaintiff. This point will be argued this week. Mr. Brice was one of the subscribers to the fund which was intended to be used in building the River Division of the Ohio Central, which was planned to connect the Ohio Central with the Richmond & Allegheny. It was represented that the sum would be sufficient to complete the River Division from Corning, Ohio, to the Chesapeake & Ohio crossing in West Virginia, including a bridge over the Ohio at Point Pleasant. The plaintiffs claim that of the \$5,000,000 \$1,240,000 was illegally loaned to the Richmond & Allegheny, \$500,000 to the Ohio Central, and that other sums were used to pay the coupons on the old roads. That, as a result, only \$3,000,000 was left for constructing purposes of the River Division, which amount being insufficient caused the collapse of the entire scheme.

Union Pacific.—It is said that the company contemplates building a short line to Leadville. Several routes have been surveyed, one being the extension of the Colorado Central from Graymont to Aspen and Leadville. Another one proposes the shortening of the present South Park route to Leadville. It is also said that the company intends to build a branch down Oil Creek from South Park to Cañon City, shortening the route from that city to Denver by nearly 40 miles.

Utica & Unadilla Valley.—Articles of incorporation of the company have been filed in New York, the capital stock being placed at \$200,000. The articles provide for the building of a road through the valley of the Unadilla River, 20 miles long, between Bridgewater station, on the Utica branch of the Delaware, Lackawanna & Western, and New Berlin, the present terminus of the New Berlin branch of the New York, Ontario & Western. From Bridgewater to Utica is 16 miles, and from New Berlin to New York, via the Ontario & Western, is 228 miles. The towns principally interested in the project are New Berlin, Leonardsville, Pittsford, Columbus, Unadilla Forks, Bridgewater and Utica. These towns have subscribed, by individual contributions, \$50,000. At a meeting of the promoters of the enterprise, held at Leonardsville on Saturday, it was announced that the full amount of the capital stock, \$200,000, had been subscribed, and that the company's agents were now engaged in securing the right of way for the road.

Virginia & Northwest.—Chartered in West Virginia to build a road from a point near the mouth of Coal River to Guyandotte Mountain, in Boone County.

Yankton, Norfolk & Southwestern.—Articles of incorporation have been filed in Nebraska by this company to construct a line of railway from a point on the Missouri River, in Cedar County, opposite the city of Yankton, Dak., through the counties of Cedar, Knox, Pierce and Madison, to the city of Norfolk, Neb. The capital stock is \$250,000.

TRAFFIC AND EARNINGS.

The Inter-state Commerce Commission.

Secretary Moseley has issued the following circular: The bureau in charge of the Auditor will hereafter be known as the Bureau of Rates and Transportation, Auditor C. C. McCain remaining at the head thereof.

In view of the importance of providing for an exhaustive compilation of statistics from the annual reports of carriers, and the great amount of detail work involved, a Bureau of Statistics has been established, which is in charge of Prof. Henry C. Adams, Statistician.

All freight tariffs, passenger tariffs, classifications, rate sheets, circulars and other printed or written matter relating to rates, together with all contracts, agreements and traffic arrangements which are required to be filed with the Commission under Section 6 of the act to regulate commerce and correspondence relating thereto, will be addressed as heretofore to C. C. McCain, Auditor Inter-state Commerce Commission, Washington, D. C.

Annual reports of carriers under Section 20 of said act, and correspondence relating thereto, will be addressed to Henry C. Adams, Statistician Inter-state Commerce Commission, Washington, D. C.

Traffic Notes.

The notice given by the Chicago & Northwestern of its intention to reduce rates on packing-house products and live stock from Omaha to Chicago has been suspended for 30 days, on the pledge of the other roads that no new contracts shall be made.

Merchants of Los Angeles, Cal., are complaining that they do not get their share of Arizona trade. The average distance from that city to Arizona points is 480 miles; from San Francisco it is nearly 1,000 miles. Yet it is claimed that freight rates from the latter point are only 10 per cent. higher than from Los Angeles. Arizona is fast being settled, and the construction of irrigating ditches is so extensive as to make it certain that a large trade will develop there.

Fresno, Cal., has shipped over 450 car-loads of raisins this

year. One car-load was recently taken from California to Portland, Me., in eleven days.

The Railroad Commissioners of Kansas have requested the roads whose lines enter the western part of the state to carry corn at reduced rates for the benefit of the farmers in that region whose crops have failed. The reduced tariff granted last year, under similar circumstances, greatly ameliorated the unfavorable conditions. This year things are worse than they were last.

The Baltimore & Ohio announces that it will withdraw from the Castle Garden joint ticket agency on Dec. 1.

It is announced that the Missouri Pacific, Atchison, Topeka & Santa Fe and other roads in the Southwest have under consideration a plan for an association to supervise freight traffic, similar to the Southern Railway and Steamship Association.

Lake rates from Chicago eastward are on a basis of 2 cents per bushel for corn to Buffalo. Seven or eight boat-loads of wheat have been shipped from New York to ports on the Erie Canal between Syracuse and Lockport.

The Atchinson, Topeka & Santa Fe has put on a through sleeping car between Chicago and San Diego, Cal., via Los Angeles. It is said that a car will be run daily, thus constituting the first regular through line between Chicago and the Pacific Coast.

The Illinois Central announces that it will run sleeping cars through from Chicago to Los Angeles, via New Orleans, every Wednesday during the winter.

The first through passenger train from Jacksonville, Fla., since the outbreak of yellow fever arrived in Atlanta, Ga., Nov. 15.

Vice-Chairman Daniels, of the Central Traffic Association, has sent to the lines in his territory outside the association the resolutions recently adopted looking to an agreement to issue passenger rate sheets quarterly instead of monthly, and basing sheets and tourist rate sheets half yearly. The labor of the compilers and the expense of printing are both heavy, and it is believed that generally the changes necessary can be postponed a month or two without detriment.

Trunk Line Rates.

West-bound rates continue unchanged. The reduction made by the New York Central last week was followed by all the lines, the Erie, West Shore, Lackawanna and Lehigh Valley issuing tariffs on the basis of 45 cents to Chicago, the Central Vermont 40 cents, and the Kanawha Dispatch (over the Newport News & Mississippi Valley), 35 cents. The reduced rail and lake rates are on a basis of 37 cents. The rates to Colorado points by boat to New Orleans and thence over the Denver, Texas & Fort Worth were reduced to a basis of \$3. The Philadelphia & Reading, which takes freight for the west from Philadelphia and vicinity, sending it over the Fall Brook Coal Co.'s road, announces that it will not participate in the present reduced rates after Dec. 1.

Car Service.

The Cleveland, Columbus, Cincinnati & Indianapolis has just issued a circular announcing that it will charge \$1 per day demurrage after 48 hours. It is stated that the Pennsylvania, which has for some time been collecting demurrage, on both its Eastern and Western systems, has already succeeded in accelerating the movement of cars very materially.

It is said that some of the roads in the interior of Ohio and Indiana are still unable to furnish one-quarter of the cars wanted for grain.

The hardwood lumber dealers of Chicago have passed resolutions to the effect that the railroads are justified in charging \$1 a day demurrage; but they claim that it should not begin until 72 instead of 48 hours after arrival of car on delivery track. A committee of the Chicago Coal Exchange has entered a protest against the demurrage agreement.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Nov. 17, amounted to 56,586 tons, against 50,851 tons during the preceding week, an increase of 5,735 tons, and against 52,519 tons during the corresponding week of 1887, an increase of 4,067 tons. The proportions were:

	W'k to Nov. 10.		W'k to Nov. 17.	
	Tons.	P. c.	Tons.	P. c.
Wabash.....	4,233	8.2	3,797	6.7
Michigan Central.....	5,394	10.5	7,311	12.9
Lake Shore & Mich. So.....	6,327	12.5	8,719	15.4
Pittsburgh, Ft. W. & Chicago.....	5,944	11.6	7,277	12.9
Chicago, St. L. & Pittsburgh.....	7,566	14.8	5,908	10.4
Baltimore & Ohio.....	1,649	3.1	5,336	9.6
Chicago & Grand Trunk.....	8,737	17.1	10,025	17.7
N. Y., Chicago & St. Louis.....	4,891	9.5	4,560	8.1
Chicago & Atlantic.....	6,085	12.7	5,623	9.9
Total.....	50,856	100.0	56,586	100.0

Of the above shipments 2,201 tons were flour, 26,385 tons grain, 4,599 tons cured meats, 2,760 tons lard, 5,417 tons dressed meats, 777 tons butter, 1,709 tons hides, 217 tons wool, and 2,982 tons lumber.

The three Vanderbilt lines together carried 36.4 per cent., while the two Pennsylvania lines carried 23.3 per cent.

Cotton.

The cotton movement for the week ending Nov. 16 is reported as follows, in bales:

	1888.	1887.	Decrease.	P. c.
Interior markets.....	172,493	220,616	48,123	21.8
Receipts.....	139,152	182,844	23,692	12.1
Shipments.....	236,480	384,794	128,314	33.3
Seaports.....	202,309	284,816	22,447	7.9
Receipts.....	173,640	195,877	22,237	11.4
Shipments.....	686,697	767,586	80,889	10.5

Coal.

The coal and coke tonnage of the Pennsylvania originating on lines east of Pittsburgh and Erie for the week ending Nov. 10, and the year to that date, was as follows:

	Coal.	Coke.	Total.
Total for week ending Nov. 10.....	227,401	91,954	319,355
Total for year 1888 to date.....	10,000,376	3,455,294	13,455,670
Total for year 1887 to date.....	8,850,536	3,123,616	11,974,152

The anthracite coal tonnage of the Belvidere division of the United Railroads of New Jersey division for the same periods was as follows:

	1888.	1887.	Inc.
Total for week.....	34,420	20,913	13,507
Total for year.....	1,435,948	1,339,403	96,545

The coal tonnage for the week ending Nov. 17 is reported as follows, in tons:

	1888.	1887.	Increase.	P. c.
Anthracite.....	902,530	758,040	144,491	19.1
Bituminous.....	344,858	303,338	41,520	13.6

The Cumberland coal trade for the week ending Nov. 17 amounted to 76,438 tons, and for the year to that date 3,186,720 tons.

Anthracite Coal Tonnage.

Mr. John H. Jones, Chief of Bureau of Anthracite Coal Statistics, has issued the following statement of anthracite coal tonnage for the month of October, 1888, and the year to Oct. 31, as compared with same period last year:

Month of October:	1888.	1887.	Inc. or Dec.
Phila. & Read.	910,354	782,082	I. 128,272
Lehigh Valley.	714,852	328,602	I. 386,250
Central of N. J.	639,715	390,891	I. 248,824
Del. & Hud. Canal Co.	774,094	699,040	I. 75,054
Del. & Hud. Canal Co.	439,932	392,347	I. 47,585
Pennsylvania.	442,282	350,377	I. 91,905
Pennsylvania Coal Co.	173,638	177,338	D. 3,700
N. Y., L. E. & W.	92,690	64,421	I. 28,269
Total.	4,187,527	3,185,290	I. 1,002,238
From Wyoming Region.	2,234,306	2,124,051	I. 110,255
Lehigh.	673,591	266,986	I. 406,605
Schuylkill.	1,279,630	1,034,262	I. 245,368

Ten months—Jan. 1 to Oct. 31:	1888.	1887.	Inc. or Dec.
Phila. & Read.	5,822,031	6,148,338	D. 326,307
Lehigh Valley.	5,450,333	5,030,278	I. 420,055
Central of N. J.	4,760,237	4,042,940	I. 717,297
Del. & Hud. Canal Co.	4,777,566	4,777,566	I. 0
Del. & Hud. Canal Co.	3,729,268	3,185,942	I. 543,326
Pennsylvania.	3,916,358	3,098,402	I. 817,956
Pennsylvania Coal Co.	1,416,777	1,274,347	I. 142,430
N. Y., L. E. & W.	788,210	628,335	I. 159,875
Total.	31,723,143	28,186,749	I. 3,536,394
From Wyoming Region.	18,375,757	15,302,773	I. 3,072,984
Lehigh.	4,518,168	4,282,615	I. 235,553
Schuylkill.	8,829,217	8,601,361	I. 227,856

The stock of coal on hand at tide-water shipping points Oct. 31, 1888, was 359,193 tons; on Sept. 30, 1888, 370,811 tons; decrease, 11,618 tons.

This statement includes the entire production of anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines, but does not represent the entire anthracite coal tonnage actually transported by the respective roads, adjustment being necessary in the compilation to avoid duplications, etc.

Northwestern Rates.

The Northwestern roads have agreed to advance the rates between Chicago and St. Paul on freight from the seaboard to a basis of 50 cents first class, beginning Dec. 1. The present first class rate is 40 cents.

Railroad Earnings.

The reports of earnings and expenses of the various railroad companies for the three months to Sept. 30 are as follows:

NEW YORK, NEW HAVEN & HARTFORD.			
	1888.	1887.	Inc. or Dec.
Gross earnings.	\$2,608,212	\$2,168,569	I. \$439,643
Oper. expenses.	2,008,382	1,611,760	I. 396,622
Net earnings.	\$609,830	\$556,809	I. \$53,021
Other income.	124,600	133,904	D. 9,304
Fixed charges.	334,882	216,765	I. 118,117
Net income.	\$449,548	\$444,948	I. \$5,600
Cash on hand.	166,507	124,828	I. 41,679
Surplus.	3,554,942	3,547,808	I. 7,134

MANHATTAN ELEVATED.			
	1888.	1887.	Inc. or Dec.
Gross earnings.	\$2,021,937	\$1,953,457	I. \$68,480
Oper. expenses.	1,117,828	1,082,715	I. 35,113
Net earnings.	\$904,109	\$870,742	I. \$33,367
Other income.	21,500	21,506	D. 6
Fixed charges.	544,156	501,334	I. 42,822
Net income.	\$381,453	\$390,914	D. \$9,461
Cash on hand.	150,326	92,627	I. 57,699
Surplus.	500,923	def. 25,646	I. 526,569

BUFFALO, ROCHESTER & PITTSBURGH.			
	1888.	1887.	Inc. or Dec.
Gross earnings.	\$493,371	\$584,320	D. \$90,949
Oper. expenses.	320,367	403,379	D. 83,012
Net earnings.	173,004	\$180,941	D. \$7,937
Other income.	2,793	14,840	D. 12,047
Fixed charges.	138,639	116,569	I. 22,070
Net income.	\$37,158	\$79,213	D. \$42,055
Cash on hand.	31,889	90,240	D. 58,351
Deficit.	6,552	sur. 154,441	D. 160,993

NORTHERN OF NEW JERSEY.			
	1888.	1887.	Inc. or Dec.
Gross earnings.	\$96,432	\$102,264	D. \$5,832
Oper. expenses.	71,551	73,357	D. 1,806
Net earnings.	26,880	28,906	D. 2,026
Fixed charges.	8,485	7,510	I. 975
Net income.	\$18,395	\$21,396	D. \$3,001
Cash on hand.	27,840	12,739	I. 15,101
Surplus.	27,742	21,039	I. 6,703

NASHVILLE, CHATTANOOGA & ST. LOUIS.			
	1888.	1887.	Inc. or Dec.
Gross earnings.	\$282,621	\$265,024	I. \$17,597
Oper. expenses.	164,775	150,108	I. 14,667
Net earnings.	\$117,846	\$114,917	I. \$2,929
Interest and taxes.	74,549	61,747	I. 12,802
Improvements.	8,457	5,984	I. 2,473
Total charges.	\$83,006	\$67,731	I. \$15,275
Surplus.	34,840	47,185	D. 12,345

FOUR MONTHS ENDING OCT. 31:			
	1888.	1887.	Inc. or Dec.
Gross earnings.	\$1,088,568	\$1,066,530	I. \$22,038
Oper. expenses.	633,755	576,481	I. 57,274
Net earnings.	\$454,813	\$490,049	D. \$35,236
Interest and taxes.	292,637	247,263	I. 45,374
Improvements.	23,832	51,122	D. 27,290
Total charges.	\$316,469	\$298,385	I. \$18,084
Surplus.	138,344	191,664	D. 53,320

Earnings of various periods are as follows:

BROOKLYN ELEVATED.			
	1888.	1887.	Inc. or Dec.
Gross earnings.	\$223,567	\$145,975	I. \$77,592
Oper. expenses.	143,961	97,056	I. 46,905
Net earnings.	\$79,606	\$48,919	I. \$30,687
Other income.	1,973	786	I. 1,187
Fixed charges.	79,660	63,769	I. 15,891
Net income.	\$1,918	def. \$14,064	I. \$15,982
Cash on hand.	7,081	94,021	D. 86,940
Deficit.	58,568	60,272	D. 1,704

NEW YORK, CHATTAHOOGA & ST. LOUIS.			
	1888.	1887.	Inc. or Dec.
Gross earnings.	\$1,131,384	\$1,100,255	I. \$31,129
Oper. expenses.	912,244	916,611	D. 4,367
Net earnings.	\$219,140	\$243,644	D. \$24,504
Fixed charges.	249,828	48,991	I. 200,837
Deficit.	\$30,689	sur. 194,652	D. \$225,341
Cash on hand.	424,665	61,802	I. 362,863
Surplus.	174,209	1,924,350	D. 1,750,141

NEW YORK & NEW ENGLAND.

The annual report of the company for the year ending Sept. 30, 1888, shows:

Gross earnings.	\$5,268,408	\$4,969,537	I. \$298,871
Oper. expenses.	3,511,090	3,221,664	I. 289,426
Net earnings.	\$1,757,318	\$1,747,873	I. \$9,445
P. c. of exp. to gr. earn.	66.6	64.8	I. 1.8

BOSTON & ALBANY.

The annual report for the year ending Sept. 30 shows:

Gross earnings.	\$8,449,340	\$8,517,039	D. \$67,699
Oper. expenses.	5,883,640	5,858,348	I. 25,292
Other income.	433,320	408,705	I. 24,615
Fixed charges.	1,329,215	1,256,187	I. 73,028

Net income.	\$1,660,807	\$1,812,209	D. \$151,402
Dividends.	1,660,807	1,566,566	I. 94,241
Surplus for year.	\$69,000	\$211,644	D. \$142,644
Sur. for last year.	547,383	617,190	D. 69,807
Cash on hand.	732,280	752,086	D. 19,806
Profit and loss def.	547,383	617,190	D. 69,807

MEXICAN CENTRAL.

Gross earnings.	\$345,587	\$367,945	D. \$22,358
Oper. expenses.	237,206	221,130	I. 16,166
Net earnings.	\$108,381	\$146,815	D. \$38,434

NINE MONTHS—Jan. 1 to Sept. 30:

Gross earnings.	\$4,167,101	\$4,334,218	I. \$167,117
Oper. expenses.	2,594,590	2,594,590	I. 0
Net earnings.	\$1,572,511	\$1,739,628	I. \$167,117

GUADALAJARA DIVISION.

Gross earnings.	\$43,203	\$43,203	I. 0
Oper. expenses.	20,284	20,284	I. 0
Net earnings.	\$22,919	\$22,919	I. 0

DENVER & RIO GRANDE.

Gross earnings.	\$721,272	\$753,551	D. \$32,279
Oper. expenses.	429,015	416,772	I. 12,243
Net earnings.	\$301,256	\$336,778	D. \$35,522
Miles operated.	1,462	1,317	I. 145

KNOXVILLE & OHIO.

Gross earnings.	\$44,670	\$41,029	I. \$3,641
Oper. expenses.	26,199	26,283	D. 84
Net earnings.	\$18,471	\$14,746	I. \$3,725

EAST TENNESSEE, VIRGINIA & GEORGIA.

Gross earnings.	\$421,957	\$463,451	D. \$41,494
Oper. expenses.	287,834	287,140	I. 694
Net earnings.	\$134,123	\$176,311	D. \$42,188

Earnings of railroad lines for various periods are reported as follows:

Month of October:	1888.	1887.	Inc. or Dec.	P. c.
Baltimore & Ohio.	\$1,404,016	\$1,480,534	D. \$76,518	5.1
Lines E. of Ohio R.	534,635	605,685	D. 71,050	8.4
Lines W. of Ohio R.	463,900	467,753	D. 3,853	9
Net.	134,871	137,612	D. 2,741	2.0
Total system.	1,392,511	1,948,287	D. 555,776	4.1

Net.	689,506	743,295	D. 53,789	7.2
Nash., Chat. & St. L.	282,620	265,024	I. 17,596	6.6
Net.	117,846	114,917	I. 2,929	2.6
Summit Branch.	131,877	172,818	D. 40,941	23.7
Net.	35,444	71,214	D. 35,770	64.1
Lykens Valley.	95,683	117,570	D. 21,887	17.2
Net.	5,494	30,307	D. 24,813	81.9

TEN MONTHS—Jan. 1 to Oct. 31:

Nash., Chat. & St. L.	2,578,583	2,520,810	I. 57,773	2.3
Net.	1,132,072	1,132,072	I. 0	0
Summit Branch.	1,221,826	1,088,636	I. 133,190	12.2
Net.	184,037	88,851	I. 95,186	107.1
Lykens Valley.	845,640	61,907	I. 783,733	35.5
Net.	16,287	def. 106,532	I. 90,245	...

MONTH OF SEPTEMBER:

Denver, So. Pk. & P.	105,711	130,818	D. 25,107	19.2
Net.	def. 298	34,135	D. 34,433	...
Grand Trunk of Can.	1,764,474	1,902,748	D. 138,274	7.3
Net.	600,695	698,007	D. 97,312	13.9
Chi. & Grand Tr.	244,742	312,781	D. 68,039	21.7
Net.	51,262	120,841	D. 69,579	57.6
Det., Gr. H. & M.	108,916	116,203	D. 7,287	10.6
Net.	31,385	41,746	D. 10,361	24.8

Kan. C. Wy. & No.	30,209	...	...	...
Net.	12,641	...	...	...
Louis., N. Alb. & C.	284,895	223,494	I. 61,401	5.1
Net.	111,571	86,099	I. 25,472	28.8
Mn. & Charles.	129,491	136,499	D. 7,008	5.3
Net.	10,515	61,385	D. 50,870	82.8

Mexican Central.	345,586	367,945	D. 22,359	6.1
Net.	108,288	146,815	D. 38,527	26.2
Guadalajara Div.	43,203	...	...	...
Net.	22,919	...	...	...
Mexican National.	168,311	139,337	I. 28,974	20.8
Net.	6,635	14,749	D. 8,114	55.2

Oregon Short Line.	182,422	182,572	I. 61,676	33.7
Net.	108,957	79,785	I. 29,172	36.6
Petersburg.	25,310	23,179	I. 2,131	10.2
Net.	8,912	def. 20,599	I. 11,687	...
Rich. & Petersburg.	18,720	20,285	D. 1,565	7.7
Net.	5,841	def. 334	I. 5,607	...

Southern Pacific Co.	3,138,088	2,540,551	I. 597,537	23.5
Pacific System.	1,280,831	1,132,513	I. 148,318	13.1
Net.	4,074,821	3,411,823	I. 662,998	19.4
Net.	1,573,074	1,425,187	I. 147,887	10.3

NINE MONTHS—Jan. 1 to Sept. 30:

Net.....	def. 298	34,135	D.	34,433	...
Grand Trunk of Can.	1,764,474	1,902,748	D.	138,274	7
Net.....	600,695	698,007	D.	97,310	13
Chi. & Grand Tr...	244,742	312,781	D.	68,039	21